An exploration of continuity of midwifery carer for women of all risk status

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Statement of authorship

This thesis contains no material published elsewhere or extracted in whole or part from a thesis by which I have qualified for or been awarded another degree or diploma.

No parts of this thesis have been submitted toward the award of any other degree or diploma in any other tertiary institution.

No other person's work has been used without due acknowledgement in the main text of the thesis.

All research procedures reported in this thesis received the approval of the relevant ethics or relevant safety committees (where required).

I also certify that the thesis has been written by me. Any assistance that I have received in my research work and the preparation of the thesis itself has been acknowledged.

Signature of candidate

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Conference presentations

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Abstract

Background

Continuity of carer is the cornerstone of the caseload midwifery model where a woman receives the majority of her maternity care from a named midwife throughout pregnancy, labour, birth and the postnatal period. This model differs from standard maternity care where midwifery continuity of carer is not provided across the pregnancy continuum. A systematic review of midwifery-led care has associated midwifery continuity models with beneficial outcomes for women (Sandall, Soltani, Gates, Shennan, & Devane, 2013). However, it is widely acknowledged that further research is needed to understand how, a complex intervention such as caseload midwifery makes a difference to clinical outcomes. This thesis aimed to explore discrete aspects of caseload midwifery care delivery in women of all risk status, and better understand which components may be contributing to outcomes associated with this model.

Methods

Two separate Case Studies were undertaken for this research. Case Study One was a single site sub-study of a multi-centred randomised controlled trial, Midwives at New Group practice Options (M@NGO). The trial compared clinical and cost outcomes of caseload midwifery care, to standard maternity care, for women irrespective of risk factors. Case Study One, measured women's contact with health professionals during the intrapartum period and the number of vaginal examinations conducted to assess labour. The presence of a known midwife during the intrapartum period was measured for women in the caseload group. Case Study Two was a descriptive study that used a non-experimental observational design to examine modes, frequency and timing of contact (face-to-face visits, phone calls, texts and emails) between caseload midwives and women in the antenatal and postnatal period.

Setting

Both Case Studies were conducted in the same setting at an Australian tertiary maternity facility providing maternity care to around 9,000 women annually, of whom 51% (n=4764) were cared for through the public system. Caseload midwifery was provided through the Midwifery Group Practice (MGP) model which was available to approximately 17% of publically funded women at the time of the study. The MGPs (N=5)

were based in five locations across the hospital catchment area. One MGP provided care specifically for young women (21 years and under). Each MGP employed the same number of midwives (n=4) working in a full time capacity.

Findings

In Case Study One, women who received caseload care saw significantly fewer health professionals (p=0.013) during the intrapartum period, compared to women in standard care, despite women having a similar median length of observed labour (6.8 hours in caseload versus 6.4 hours in standard care) and the presence of obstetric/medical risk factors (50%; 94/186 in caseload versus 49%; 88/178) in standard care. A high proportion of women in the caseload group received intrapartum care from a primary or backup midwife (96%; 178/186). In Case Study Two, details of 1,442 contacts between caseload midwives and women were obtained. The majority of contacts were with the primary midwife (77%; 1,085/1,413) between the hours of 0700-1459 (72 %; 1,027/1,410). Over a third of contacts between caseload midwives and women were via text (37%; 537/1,442).

Conclusion

The exploration of specific aspects of caseload midwifery care across the pregnancy continuum has provided a greater insight into some of the mechanisms which may contribute to outcomes. In the intrapartum period, the high number of known midwives seen by women in the caseload group indicates that midwifery continuity of carer has been achieved in this study. The pattern of contact between caseload midwives and women in the antenatal and postnatal period within daytime hours is reassuring for midwives who are concerned about the after-hours and on-call burden. The modes of contact used by caseload midwives and women confirm mobile technologies as a significant and evolving aspect of caseload practice. However, the use of text as the preferred communication modality raises issues regarding data security, accountability, and equity of access and text management during off-duty periods.

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Glossary

Sources used include midwifery (Henderson & Macdonald, 2004), medical (Beckmann, 2010) and research (Polit & Beck, 2010) text books or as referenced.

A priori	Latin for 'from what comes before' or 'from the earlier'. In this research it refers to outcomes being established prior to the study commencing.
Amniotomy	Artificial rupture of the membranes.
Augmentation	Stimulation of uterine contractions when spontaneous labour has not resulted in cervical dilation or descent of the fetus. It can be achieved by amniotomy (see above) and/or synthetic oxytocin (syntocinon).
Baseline characteristics	An initial finding or value, before any formal intervention has been introduced.
Blinding	The process of preventing those in the study (participants, intervention agents or data collectors) from having information that could lead to bias – also called *masking*.
Cochrane collaboration	Not-for-profit organisation with collaborators from over 120 countries working together to produce credible, accessible health information that is free from commercial sponsorship and other conflicts of interest.
Cochrane Systematic Reviews	A rigorous and systematic synthesis of research findings on a research question. Internationally recognised as the highest standard of publication on evidence-based health care. Reviews are published online in The Cochrane Library.
Core Midwife	Midwives within a maternity unit who do not participate in team midwifery or caseload/group practice models. They may be based in one area (antenatal, labour and birth or postnatal) and may not necessarily follow the same group of women throughout the child bearing period (Queensland Department of Health, 2012, p. 62).
CONSORT	A checklist of essential items to be included in the reporting of RCTs and a diagram for documenting the flow of participants.
Eligible Midwife	An eligible midwife is defined as a midwife deemed competent to provide pregnancy, labour, birth and postnatal care to women and their infants and is qualified to provide the associated services (i.e. prescribe medications) and order diagnostic investigations, once an endorsement for scheduled medicines has been attained (Nursing and Midwifery Board of Australia, 2013).
Group antenatal care	Where a group of approximately 8–12 women of a similar gestation meet regularly at a hospital or community venue for their antenatal care and education (Allen, Gamble, Stapleton, & Kildea, 2012, p. 3).

Intrapartum	Occurring during labour and birth.
Low-risk pregnancy	Uncomplicated pregnancy with no known obstetric, medical or psychosocial risk factors.
MATRIX	Hospital Obstetric Database and Maternity Care Solution developed for Mater Health Service Group by Meridian Health Informatics.
Midwifery guidelines for referral and consultation	A - DISCUSS Discuss the situation with a colleague midwife and/or with a medical colleague or other health care provider. The responsibility for maternity care in the situation described is with the midwife. B - CONSULT Evaluation involving both primary and secondary care needs. The individual situation of the woman will be evaluated and agreements will be made about the responsibility for maternity care. C - REFER A situation requiring medical care at a secondary, or tertiary, level for as long as the situation exists (Australian College of Midwives, 2008, p. 17).
Multiparous	Pregnant woman who has had at least 1 previous pregnancy resulting in a live birth or stillbirth.
Obstetric database	Electronic database containing information about women's pregnancy, childbirth and postpartum period.
Parity	Number of previous pregnancies resulting in live births or stillbirths, excluding the current pregnancy. (Perinatal death is defined as a fetal or neonatal death of at least 20 weeks gestation or at least 400 grams birthweight) (Hilder, Zhichao, Parker, Jahan, & Chambers, 2014, p. 119).
Primiparous	Pregnant woman who has had no previous pregnancy resulting in a live birth or stillbirth.
Statistical power	The ability of the research design or analytic strategy to detect true relationships among variables.
Statistical significance	A term indicating that results from an analysis of sample data are unlikely to have been caused by chance, at a specified level of probability.
STROBE	A checklist of essential 22 items for reporting of observational studies.
Tertiary hospital	Catering for the mother and baby who have normal to highly complex care needs. It has an antenatal care service with access to a maternal foetal medicine unit and the birthing care has the equivalent on site neonatal service capability to support birth at any gestation (Commonwealth of Australia, 2013b, p. 20).

Abbreviations

ACM	Australian College of Midwives
AHPRA	Australian Health Practitioner Regulation Agency
ANMC	Australian Nurses and Midwifery Council
CONSORT	Consolidated Standards of Reporting Trials
COSMOS	COmparing Standard Maternity care with One-to-one midwifery Support: a randomised controlled trial
HREC	Human Research Ethics Committee
LMC	Lead Maternity Carer
M@NGO	Midwives @ New Group practice Options
MBS	Medical Benefits Schedule
MGP	Midwifery Group Practice
NCCSDO	National Co-ordinating Centre for NHS Service Delivery and Organisation
NHMRC	National Health and Medical Research Council
NHS	National Health Service
PBS	Pharmaceutical Benefits Scheme
PAOU	Pregnancy Assessment and Observation Unit
RCT	Randomised Controlled Trial
SEIFA	Socio-Economic Indexes for Areas
SPOT	Student Placement Online Tool
SPSS	Statistical Package for the Social Sciences
STOMP	St George Outreach Maternity Project
STROBE	Statement for strengthening the reporting of observational studies in epidemiology
VERDI	Virtual Electronic Record Data Integrator

Chapter One: Introduction

Overview

This chapter offers a background to the way in which midwifery care is provided in Australia, and the concept of continuity of care. The caseload model of midwifery care is introduced; a justification for the research is given, followed by the research aims and objectives. Finally, a summary of the thesis structure is provided.

Midwifery in the Australian context

The role of the midwife in Australia has evolved through a unique socio-historical context and healthcare system that is different to other Western countries, including the United Kingdom (UK), Netherlands and New Zealand (NZ) which themselves vary in regard to place of practice, education and regulation.

From a historical perspective, Australia progressed from being a British penal settlement (in 1788) toward a free colony in the first few decades from colonisation. Increasing numbers of female immigrants were sought from Britain (from 1823 onwards) as a means of establishing the population. Early settlers gave birth at home assisted by 'lay' midwives, or less often in private maternity homes run by trained midwives or doctors (Pairman, Tracy, Thorogood, & Pincombe, 2010). The poor conditions surrounding home and community-based birth led to the establishment of hospitals for women in two major Australian cities – Melbourne (in 1886) and Sydney (in 1893).

Despite the availability of hospital services for all women, the majority of births continued to take place in the home until after World War One, from which time childbirth moved increasingly into the hospital setting as it was considered a safer option for birth (Pairman, Tracy, Thorogood, & Pincombe, 2015). The shift from home to hospital birth is thought to have resulted in a loss of autonomy and identity for midwives as care became more medicalised (Pairman et al., 2010). The introduction of a (five pound) Maternity Allowance for women (Australian Government, 1912) aimed at increasing the country's population gave women the financial means to use a medical doctor for birth in preference to using a midwife.

The first midwifery training course commenced at the Women's Hospital in Melbourne in 1888. The first Australian Midwives Act was passed by the Parliament of Tasmania in

December 1911, repealing the previous Midwifery Nurses Act (1901) and the Midwifery Nurses Amendment Act (1906) (Tasmanian Government, 1911). A separate Nurses Act was established in 1923 that excluded nurses from attending childbirth unless they were also a registered midwife. However, a further Nurses Act passed in 1928 abolished the Midwives Board and once again brought midwifery under the control of nursing in Australia (Fahy, 2007). The prerequisite for nursing training remained until 2002 when it became possible to train as a midwife without a prior nursing qualification (Seibold, 2005).

The first university based, three year, Bachelor of Midwifery programme was developed and commenced in 2002 (McKenna & Rolls, 2007). This type of training is designed to generate a midwifery workforce able to perform to the full scope of midwifery practice at the point of registration (ICM, 2005). The Australian College of Midwives (ACM), which was founded in 1984, has made a significant contribution to developing the role of the midwife including the Bachelor of Midwifery programme. As the professional body for midwives, the ACM have been strategic in partnering with advocacy groups such as Maternity Coalition to ensure the midwifery agenda remains in touch with the needs of consumers (Maternity Coalition, 2002).

The Australian Nursing and Midwifery Council (ANMC) has also been influential in midwifery practice by achieving nationally consistent competency standards in midwifery regulation (Homer et al., 2007). Prior to formulation of the standards, the ANMC commissioned the first scoping exercise on the role of the midwife in Australia (Homer et al., 2009). Both women and midwives identified key elements of the midwife's role which included being women-centred, providing safe and effective care, and collaborating with others when required. Barriers to the midwife's role included the lack of opportunity to work across the full spectrum of maternity care, medical domination, and lack of a clear image of what the role of the midwife means to members of the community (Homer et al., 2009). Opportunities for midwives to undertake roles which encompass their full scope of practice are often limited to the midwifery services on offer, in the healthcare institutions and locations across Australia in which they work (Brown & Dietsch, 2013).

Over time, midwives have faced fluctuations in the legal recognition of midwifery, competing interests of medicine, and the pre-requisite of nursing training. However they have continued in their quest to establish midwifery as a recognised profession in its own right (Homer et al., 2007). Australian midwives have however, not been able to achieve the

same practice-related autonomy as their counterparts in the UK and New Zealand. The reason is largely due to Australia's differing health care system. In the UK the majority of women access maternity care free of charge through National Health Service (NHS) facilities which are publically funded (NHS, 2015); in New Zealand the majority of maternity care is also provided free of charge by Lead Maternity Carers (LMCs), who are contracted by the Ministry of Health and are mostly midwives (Ministry of Health, 2014).

Healthcare funding in Australia

As elsewhere, the structure of healthcare funding in Australia has a direct influence on the delivery of health, including maternity services. The nationally-funded health insurance scheme Medicare, introduced in 1984, provides free or subsidised healthcare to all Australians (Department of Human Services, 2013). The Medicare scheme is a financial arrangement by the Commonwealth government which provides free or subsidised access to treatment as a public (Medicare) patient in a public hospital or healthcare provider. Benefits are paid in accordance with the legislation governing Medicare (Department of Human Services, 2013). The accountability for healthcare funding, which is shared between Australian states (funding in-hospital services) and Commonwealth governments (funding out-of-hospital services), has been identified as being poorly coordinated and fragmented (Australian Government, 2014).

The introduction of Medicare resulted in changes to healthcare funding with unintended consequences for maternity care. When the availability of Medicare saw a decline in uptake of private health insurance, the Australian Government offered an incentive to encourage health fund membership which included a universal 30% rebate on health insurance premiums from 1 January, 1999 (Australian Bureau of Statistics, 2007). With more affordable access to privately funded services, obstetricians and private hospitals became the choice of maternity care for many women (Pairman et al., 2015). Although the 30% rebate scheme was scrapped in 2009, a Medicare Levy Surcharge of 1% to 1.5% (means tested) was introduced in 1997 to encourage high income earners (those with single earnings over $88,000 pa and those with combined household earnings over $176,001 pa) to take out private health insurance (Department of Health and Ageing, 2011). The Medicare Levy Surcharge has continued to incentivise the uptake of private health (and obstetric) services in Australia (Australian Taxation Office, 2014).

Another major change to health funding was the Medicare Safety Net, which was introduced in 2004, as a means of reducing citizens' health care costs by covering 80% of fees after out-of-pocket expenses had reached $700 per annum. The introduction of the Medicare Safety Net saw a sudden increase in billing to Medicare for obstetric and related services and it is thought that the scheme unintentionally provided incentives for obstetricians to; increase their fees, provide additional diagnostic testing and use a greater number of higher billing items for complicated births (Pairman et al., 2015). Despite the costs of maternity care continuing to rise and rebates failing to increase with inflation, 30% of women in Australian today continue to access maternity care through the private system under the care of an obstetrician (Hilder et al., 2014).

Australian maternity services and midwifery practice

In 2008, a review of the delivery of maternity services was commissioned by the then Minister for Health and Ageing (Hon. Nicola Roxon). The review highlighted that although Australia was considered one of the safest places in the world to give birth (or be born) current maternity care was not was meeting the needs of all women, stating that "in light of current evidence and consumer preference there is a case to expand the range of models of maternity care"(Commonwealth of Australia, 2009, p. iii). The Commonwealth reform package that followed enabled Australian women to access Medicare-funded midwifery care for the first time.

Medicare Eligible Midwives

In April 2010, the *Health Insurance Act* 1973 was amended to provide new arrangements to expand the role of certain midwives in the provision of health services (Commonwealth of Australia, 2010a). From November 2010, new laws were introduced which gave appropriately qualified and experienced midwives the opportunity to provide Medicare-eligible services including; antenatal and postnatal care, intrapartum care in a hospital (or hospital birthing centre) and requests for diagnostic imaging and pathology services for which Medicare benefits could be paid (Commonwealth of Australia, 2010b). To be able provide these services; midwives were (and still are) required to become a registered provider with Medicare Australia and obtain a Medicare provider number and Pharmaceutical Benefits Scheme (PBS) prescriber number.

The introduction of payment of Medicare rebates for services provided by eligible midwives however, was conditional upon the midwife providing the service under a 'collaborative arrangement' with one or more 'specified medical practitioners' (Commonwealth of Australia, 2010a). As there was no requirement for doctors to participate in these arrangements, midwives who wished to practice privately were unable to do so, because of the lack doctors willing to collaborate (Heatley & Kruske, 2011).

In recognition of the difficulties faced by midwives in establishing collaborative agreements, in 2012 the Commonwealth government decided to expand the available options for collaborative arrangements to include hospitals that employ or engage one or more obstetric specified medical practitioners (Commonwealth of Australia, 2013a). The amendment aimed to make it easier for midwives to work collaboratively and participate in Medicare arrangements. Eligible midwives make up less than 5% of the Australian midwifery workforce today where the numbers vary in each state (Nursing and Midwifery Board of Australia, 2015). The jurisdiction of Queensland (a large state in Australia) has progressed further than other states in this area, with several large tertiary hospitals (see glossary) now collaborating with eligible midwives. However, in the setting where this research was conducted, the credentialing framework for eligible midwives is still in progress and due for completion during 2015.

Continuity of care

The term 'continuity of care' has been most commonly used in non-maternity care settings. It refers to continuous and coordinated care for patients and applies to individuals rather than groups (G. Freeman et al., 2007). Continuity of care is described as having two main elements – care that it is individualised, and is received over time (R. Reid, Haggerty, & McKendry, 2002). Continuity of care has three main types – information, management and relationship. Although each type of continuity is common to all health care disciplines, it is thought to be expressed differently depending on the specific health care context (Haggerty et al., 2003).

Continuity of care entered the maternity services agenda in the UK in the mid-1980s when it was recognised that childbearing women were experiencing fragmented maternity care that was lacking in continuity (Maternity Services Advisory Committee, 1982).

Recommendations for change centred on greater continuity of midwifery care and the restoration of the role of the midwife.

In Australia, a review of maternity services conducted from 1988–1989 recommended similar changes through the introduction and evaluation of services providing continuity of midwifery care (NSW Health Department, 1989). In Australian maternity services, the term 'continuity of care' is used to describe a process or philosophy of care shared by a group of individuals who aim to provide seamless and consistent care to childbearing women (Commonwealth of Australia, 2008). Where there is a named individual responsible for care throughout the episode of maternity care, the term 'continuity of carer' is used. It is important to make the distinction between continuity of care and carer as each involves different processes of maternity care delivery.

Australian Government policy recommends that continuity of maternity care, and where possible continuity of carer, is available to all childbearing women (Commonwealth of Australia, 2009). Continuity of maternity care may be provided by a variety of maternity professionals including midwives, general practitioners (GPs) and obstetricians. The term continuity of carer most commonly refers to care provided by a midwife.

Midwifery models of care

A 'model of care' may be considered as a multifaceted concept, which broadly defines the way health services are delivered (Queensland Health, 2000). Midwifery models of care typically position midwives as the primary caregivers (Queensland Department of Health, 2012). The role of the midwife is determined by the model of care in which they work, which is dictated by the range of maternity services available to women.

In Australia today, the majority (97%) of women give birth in conventional labour ward settings with far fewer women accessing birth centres (2%) or having planned home births (Hilder et al., 2014). Women may arrange maternity care by a privately-practising (self-employed) midwife who, if eligible, is able to offer a Medicare rebate for antenatal, intrapartum and postnatal services for up to six weeks following birth.

Midwives working in the public sector typically work with three broad models of care: standard care, team midwifery or caseload midwifery (within MGPs) – these are detailed below. Wages and working conditions for all Australian public sector midwives are

legislated through the nurses and midwives award in each state and include special conditions (including an annualised salary) for caseload midwives (Queensland Department of Health, 2012). Midwives working in team models or standard care models in Australia are not eligible to receive an annualised salary.

Standard care

The majority of midwives employed in Australia work in hospitals as core midwives (see glossary) within standard care models (Australian Institute of Health and Welfare, 2013) and they typically work eight or twelve hour rostered shifts across the 24-hour period, seven days per week. Core midwives may be based in one area (i.e. antenatal, labour and birth, or postnatal) or may rotate around different clinical areas or specialities. Core midwives do not work within team midwifery or caseload models nor do they follow the same group of women throughout the childbearing period. Some core midwives work in care settings which cater for women with particular needs (i.e. refugee women, women affected by substance use or a high risk pregnancy) and may offer a degree of continuity of care, however this usually occurs only in the antenatal period. A core midwife is not a named maternity carer across the entire pregnancy continuum and is not generally available for 24-hour telephone support, intrapartum or postnatal care.

Team midwifery

In the team midwifery model, groups of midwives are organised into teams which collaborate to provide antenatal, intrapartum and postnatal care for a defined group of women (Homer, Brodie, & Leap, 2008). Team midwifery models generally consist of six to eight midwives (Queensland Department of Health, 2012), however the size of the team may be larger (up to 20) depending on local arrangements. Team midwives are available to offer antenatal advice and intrapartum care to woman 24 hours a day and attend postnatal visits while the woman remains in hospital (Waldenström, Brown, McLachlan, Forster, & Brennecke, 2000). However due to the size of the team, the midwife on-call may not be known to the woman (Biró, Waldenström, Brown, & Pannifex, 2003). Team midwifery offers a degree of continuity of care (e.g. consistency in the use of protocols and guidelines and a shared philosophy of care) but continuity of carer is not guaranteed and can be extremely challenging to provide when teams are larger as they may only be on-call one night per-week.

Caseload midwifery

Midwives working in caseload midwifery models have their own caseload of women for whom they provide the majority of antenatal, intrapartum and postnatal care (Queensland Department of Health, 2012). Caseload midwives typically work in small groups (two to four) known as Midwifery Group Practices (MGPs) with the midwives providing backup for each other as required. As the MGP model is comprised of a smaller group of midwives than the team model, women are more likely to have the opportunity to get to know all midwives prior to birth. Some MGPs promote this by using strategies such as group antenatal care, where all midwives are present on days when antenatal clinic and education are provided together in a group setting. When on-duty, caseload midwives may be contacted by women 24 hours a day via mobile phone. Having 24-hour access to a named midwife is a unique feature of the caseload midwifery model and is also a predictor of women's satisfaction with maternity care (Miller, Thompson, Porter, & Lee, 2010). A caseload midwife who works full-time will provide care to approximately 40 women over a 12-month period and part-time employees will provide care on a proportional basis. Caseload midwives may have a reduced number of women if the group they provide care for is of higher complexity (i.e. young women or those with significant obstetric, medical or psychosocial risk) or in the case of women living in rural areas who may take a longer time to reach.

The annualised salary that is paid to midwives working in a caseload model is in recognition of the flexible patterns of work required to provide continuity of carer (Queensland Department of Health, 2012). A caseload midwife may work up to, but not longer than, 12 hours continuously, however she must have at least eight hours off duty within any 24-hour period. Caseload midwives are required to have an average of four days off duty per fortnight, with at least two consecutive days free of planned work (i.e. being on-call) and are not permitted to work for more than seven days in succession (Queensland Department of Health, 2012). Caseload midwifery is currently the primary model in which continuity of carer is ensured. It assists with the development of a relationship of trust between the midwife and the woman over the duration of the maternity episode (Homer et al., 2008). The caseload midwifery model is the focus of this research.

Midwifery continuity models

Midwifery continuity models began to emerge in Australia in the mid-1990s (Kenny, Brodie, Eckerman, & Hall, 1994). They have expanded since that time, and have varied

depending on the local context. However, despite both national and jurisdictional reviews of maternity services all recommending midwifery continuity models in all Australian states and territories for example (Banscott Health Consulting Pty Ltd, 2007; Hirst, 2005; NSW Health, 2010) the proportion of women able to access these models of care at last report was less than 10% (Commonwealth of Australia, 2011).

Strategies for progressing midwifery continuity models include maintaining alliances with consumers and advocacy groups who are often more proactive in lobbying policy makers to effect change, collaboration with medical colleagues to develop systems of referral and support, and generating interest amongst non-caseload midwives to enter continuity models (Homer, 2006).

Continuity models in Australia, including caseload midwifery, have been associated with higher normal birth rates, reduced intrapartum interventions, fewer neonatal admissions to nursery and women's satisfaction with maternity care (Sandall et al., 2013) however further research examining how models of midwifery continuity differs from standard maternity care, for women of all obstetric risk status, is needed.

Justification for the research

Continuity models in Australia, including caseload midwifery, have been associated with positive maternal and infant outcomes (Sandall et al., 2013) however a greater understanding of possible causal mechanisms is lacking. As a complex intervention, the means to adequately measure outcomes is essential (Craig et al., 2008). This research has been designed to contribute to the body of knowledge of continuity within the caseload model of midwifery care.

Research Aim

The overarching aim of this project was to use a Case Study approach to explore discrete aspects of caseload midwifery care delivery in women of all risk status, and better understand which components may be contributing to outcomes associated with this model.

Research Objectives

The research objectives were to:

i. Measure the number of health professionals who provided intrapartum care to women, and the number of vaginal examinations performed to assess progress in labour, in a caseload midwifery model compared to standard maternity care (Case Study One).

ii. Measure modes of communication used between caseload midwives and women in the antenatal and postnatal periods (Case Study Two).

The structure of the thesis

As the research involved two Case Studies, each will be described separately throughout the thesis. The thesis is divided into five chapters including this Introduction (Chapter One). The remaining chapters are presented below:

Chapter Two: Literature Review

Chapter Two will discuss the literature relevant to the topic of continuity of care in the caseload midwifery model. The chapter commences with details of the strategy used to search and locate the relevant literature. An overview of the concept of continuity of care and how it has been defined and researched in non-midwifery settings is provided. Literature pertaining to continuity of care within the midwifery context then follows. The chapter goes on to discuss the literature relevant to each Case Study: Case Study One discusses intrapartum continuity of care; Case Study Two discusses communication strategies and use of mobile technologies in maternity contexts, particularly within the caseload model. The chapter will conclude by identifying the research gaps that will be addressed in this thesis.

Chapter Three: Methods

This chapter provides a detailed description of the research methods used in this study. The chapter commences with a description of the methodology underpinning the research and the rationale for using the multiple Case Study design. Although both Case Studies were conducted at the same setting (previously explained p vi.) each used a different design. The methods for each are therefore described separately.

Case Study One was a single centre nested sub-study of the multi-centre RCT (M@NGO) which compared outcomes and costs of caseload midwifery to standard maternity care for women of all risk status (S. Tracy et al., 2013). Case Study One involved participants at Site 2 of the M@NGO trial (n=420) who were randomised to caseload (intervention) or standard (control) care groups. The methods will describe in detail how a nested sub-study was used to explore women's intrapartum contact with health professionals.

Case Study Two used a descriptive non-experimental observational design to examine modes, frequency and timing of communication and the use of mobile technologies, between caseload midwives and women in the antenatal and postnatal period.

Chapter Four: Results

This chapter provides details of the results from both Case Studies. The results for Case Study One commences with an outline of the baseline characteristics of participants followed by results of the primary and secondary outcome measures. Results for Case Study Two include the mode, timing and frequency of contact between women and caseload midwives across the antenatal and postnatal period. Demographic data on the women and caseload midwives are also presented. An overall summary of results for both case studies is then given.

Chapter Five: Discussion and Conclusion

In this chapter a discussion and conclusion for each Case Study is presented separately. Implications for practice and considerations for future research are also provided. The findings for each Case Study are discussed in relation to study aims, objectives, current evidence and the broader context of midwifery continuity of carer.

A combined discussion is then presented which draws on outcomes from both Case Studies to describe how this study has addressed the research questions. A conclusion to the thesis is then provided.

Summary

This chapter has provided an overview of midwifery in Australia and the concept of continuity of care and carer in the Australian midwifery context. Models of midwifery care including team, caseload midwifery and standard care were also described. A justification

for exploring the research topic was provided, along with research aims and objectives. Finally the structure of the thesis was provided.

Chapter Two: Literature Review

Introduction

This chapter reviews the literature pertinent to the topic of continuity of care provision within the caseload midwifery model. It begins with a description of the literature search strategy and then goes on to discuss each area of importance related to the research topic. The first section situates continuity of care in the broader health literature. Continuity of care in the midwifery context then follows and includes how it has been defined and tested, the relevance of the midwife-woman relationship, influence of setting and midwifery continuity measures and outcomes are all discussed.

The literature that is relevant to each of the two Case Studies is presented in two sections. The first section focuses on contact between women and health professionals during the intrapartum period; the second section focuses on communication modalities used in maternity contexts, including the caseload midwifery model.

Literature search strategy

The ACU on-line library was used as the main resource to locate literature using the Ebcohost database platform, from which point the following databases were selected: CINAHL, PubMed, Academic Search Complete, JBI COnNECT (Johanna Briggs Institute), The Cochrane Library and the Allied and Complimentary Medicine Database (AHMED).

An initial literature search was conducted, based on the topic of continuity of care in caseload midwifery. A variety of search terms were used and included the following: "One-to-one midwifery", "caseload midwifery", "midwifery group practice", 'midwifery continuity", "continuity of care", 'midwifery-led care" and "relational continuity". Later search terms included "birth place" "vaginal examination", "professionals AND labour".

Publications were included if they were written in English and published in the last decade until the time of writing (2015). However some sources that were located earlier were included as they offered a historical perspective. Peer-reviewed journals publishing research articles were the predominant source of literature obtained, however government policy documents and midwifery texts books were also accessed. Not all sources used were found by direct searching as some were located within the text and reference lists of articles. A combination of quantitative, qualitative and mixed method approaches was found and

publications retrieved included; systematic reviews, randomised controlled trials, and descriptive studies. As more than half of the studies retrieved were qualitative a traditional 'evidence hierarchy' could not be used (Polit & Beck, 2010). Hence a theoretical framework for appraisal was used to guide their assessment (Walsh & Downe, 2006). A research protocol template (Appendix 1) was used to assess and catalogue the relevant literature (Polit & Beck, 2010).

Literature was kept updated by placing alerts on major midwifery journals including 'Midwifery', 'Birth' and 'Women and Birth". EndNote bibliographic software (Thomson Reuters, 1988-2013), version X7, was used to record and manage references and streamline document management.

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The American Psychological Association (APA) 6th edition referencing style has been used throughout. The initials of two authors will appear within in-text citations in this thesis as it is in keeping with the APA 6th referencing style which states:

> "where there are two or more authors with the same surname, include the first author's initials all initials in all text citations, even if the year of publication differs. Initials help the reader to avoid confusion within the text and to locate the entry in the list of references" (American Psychological Association, 2012, p. 176).

Continuity of care in non-midwifery settings

The first reported discussions on the topic of continuity of care in health began in 1999 in the United Kingdom and were initiated by the National Co-ordinating Centre for National Health Service Delivery and Organisation Research and Development (NCCSDO). They identified continuity of care as one of the nine priority themes for health (Fulop & Allen, 2000). Soon afterwards the NCCSDO commissioned a scoping exercise aimed at describing the concept of continuity of care in health, as well as summarising previous research and suggesting priorities for future research (G. Freeman, Shepperd, Robinson, Ehrich, & Richards, 2001). After mapping the evidence, the NCCSDO's program agreed on a working

definition and conceptual framework. The early definition of continuity, as a multi-dimensional concept experienced by patients and carers, provided a basis for early research (G. Freeman et al., 2001). As continuity was considered an outcome as well as a process of care, an emphasis was placed on examining continuity from these perspectives. The result was continuity research that focused on survey-based patient satisfaction outcome measures. Over the next six years a major programme of UK-based research was conducted which included six longitudinal projects and several short evaluations. The programme's research areas included primary care, diabetes, mental health and cancer care. These studies demonstrated how continuity was applied and measured across various disciplines and in different clinical settings.

The Canadian Health Services Research Foundation commissioned a programme of research on the same topic over a similar time period (1999-2005), which comprised of more than 70 small projects and a wider range of topics. The Canadian programme commenced with a systematic survey of the literature on the topic of continuity of care which culminated in a two day workshop in June 2011, in which 59 researchers were involved (R. Reid et al., 2002). At the end of the workshop the researchers agreed on a working definition of continuity, which included two core elements and three types. The two core elements stated that continuity must be experienced by an individual and be received over time. The three types of continuity were defined as "informational continuity (transfer of information and accumulated knowledge of patient), relational continuity (the ongoing patient-provider relationship and consistency of personnel) and management continuity (consistency of care and flexibility)" (R. Reid et al., 2002, pp. 3-4).

All three types of continuity are thought to exist in all health care settings, however the specific health care domain will determine how much emphasis is placed on the specific type of continuity and how it is expressed (Haggerty et al., 2003). It is therefore recommended that researchers focus on the relationship between the three dimensions to explore each of the discrete elements within the context of the relevant health care setting (Saultz, 2003). This recommendation came from a review of continuity studies where the relational element was featured but not examined further, and the failure to explore the potential link between relational continuity (e.g. as reported in patient-provider relationships) to longitudinal outcomes, was viewed as problematic (Saultz & Albedaiwi, 2004). This finding resulted in a recommendation that specific and measurable outcomes of

the three elements of continuity be a feature of future research (Saultz & Lochner, 2005). Defining three types of continuity provided a solid foundation for understanding the complexity of continuity of care and its implications for policy and practice (G. Freeman et al., 2007).

The NCCSDO concluded its programme with a critical interpretive synthesis of all previous research and put forward implications for policy, practice and further research (Parker, Corden, & Heaton, 2010). It provided an updated definition of continuity which included that it was co-constructed arising from service users and health professionals forming a partnership. This new understanding of achieving continuity through partnerships, invited researchers to include the perspective of care providers in future studies (Parker et al., 2010).

Complex interventions

Continuity of care has been defined as a complex intervention because it has several interrelated and interdependent components (Craig et al., 2008). Interventions in health care are often highly complex because they frequently involve patient care, changes to staff behaviours, healthcare organisation and service delivery (Blackwood, 2006). Assessing the components of practitioner behaviours and the frequency of these behaviours adds to the challenge of measuring and standardising the reporting of complex interventions. The key to evaluating complex interventions is therefore to identify the active ingredients exerting any effects, to enable ongoing measurement and reporting. Achieving an understanding of causal mechanisms allows more effective interventions to be designed and applied across similar groups and settings (Craig et al., 2008).

Additionally, if the expected outcomes are not produced, further monitoring each of the active ingredients may help to identify a possible cause. A detailed description of the intervention when reporting results is important in order to enable replication of studies, however accordingly to Craig et al. (2008) this is often done poorly. The use of established reporting guidelines such as the Statement for the Transparent Reporting of Clinical Trials (CONSORT) and Statement for Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) can assist researchers in providing essential information regarding evaluation and reporting of complex interventions.

Continuity in the midwifery context

Background

Concern over infant and maternal mortality saw a shift from birthing in the home or community-based settings to the hospital in industrialised countries in the early 1900s (Tew, 1990). However, in the UK many women did not have insurance cover for hospital care, or were restricted in the areas in which they lived, so many were unable to access birth in a hospital. With the creation of National Health Service (NHS) in 1948 in the UK and the removal of the requirement for insurance, the move towards hospital birth accelerated. In 1959 the *Cranbrook Report* went onto recommend that beds be available for 75% of births to take place in hospital (Ministry of Health, 1959). The later *Peel Report* (Department of Health and Social Security, 1970) increased this number by recommending that hospital beds be available for 100% of birthing women (irrespective of health risk). The active promotion of hospital birth as the safest option for women, further encouraged consumer demand for hospital birth despite the recommendations being later criticised for the lack of evidence to support their safety claims (O'Brien, 1978). The combined impact of the *Peel Report*, consumer beliefs about risk and safety, and the growing power of the acute hospital sector in managing healthcare, saw the shift from home to hospital birth increase dramatically, where by the mid-1970s, over 95% of births took place in hospital (McIntosh, 2013).

The shift of birth from community-based maternity services to the hospital setting is thought to be where the autonomous and central role of the midwife began to erode and become eclipsed by a more medicalised approach to birth (Marshall, 2005). It wasn't until the late 1970s in the UK that it was realised that this shift had resulted in maternity care that was fragmented and lacking in continuity (Flint, 1986). Recommendations for changes to the way maternity care was organised followed, in which continuity of midwifery care was a key feature (Maternity Services Advisory Committee, 1982). The *Know Your Midwife Scheme* set up at St George's Hospital London, UK, was the first midwife-led hospital-based project to provide midwifery continuity to women across the pregnancy continuum (Flint, 1986).The UK *Maternity Services Review* (House of Commons Health Committee, 1992) and the later *Changing Childbirth* report (Department of Health, 1993) formalised the provision of midwifery continuity by making it government policy in England in 1993. Key recommendations in the report included restoring the role of the midwife and a focus on

continuity of care (Department of Health, 1993). The report also recommended that every pregnant woman should be allocated a named midwife and must know their lead professional (midwife, GP or obstetrician). Targets for service provision included at least 75% of women should know the person who cares for them during labour and birth, and that 30% of lead professionals should be midwives. Following the release of the *Changing Childbirth* report, maternity services in the UK (and internationally) started to develop midwifery models which aimed to provide midwifery continuity of care and meet these targets.

The trajectory for continuity in maternity care in countries outside of the UK has varied greatly. For example in Canada a consumer backlash against the medicalisation of birth in the late 1970s, saw a shift in midwifery practice back to the community through the homebirth movement (Bourgeault, 2000). This shift saw midwifery practice in Canada remain unregulated until 1994 (Malott, Davis, McDonald, & Hutton, 2009). Whereas in New Zealand, midwifery practice was dominated by the medical model until changes to the Nurses Act (Department of Health, 1990) led to midwives being able to act as lead maternity carers (LMCs). Legislative and funding changes provided to midwives in NZ who supported women in their choice of birth location, allowed autonomous and independent midwifery practice with the support of government funding (Guililland, 1999). From 2001-2010 the number of women in NZ registering with a midwife LMC increased from 53.4% to 78.2% (Ministry of Health, 2011).

In Australia, midwifery practice has historically been guided by UK initiatives and policy. For example, in 1989 the *Shearman Report* recognised that midwives skills in this country were being under-utilised and that opportunities existed for maternity care models to enhance midwifery continuity (NSW Health Department, 1989). The report suggested a number of strategies to improve continuity, which included the introduction of pilot projects such as the aforementioned *Know Your Midwife Scheme,* to assess acceptability in an Australian setting. The *Team Midwifery Pilot Project* conducted at Westmead Hospital in NSW, was the first Australian RCT to implement and evaluate midwifery continuity of care (Kenny et al., 1994).

Since that time Australian midwifery researchers have continued to conduct research on midwifery continuity models including the team midwifery and the caseload midwifery models (Homer et al., 2009). Research outcomes have identified these models, as being as

safe and more cost effective (S. Tracy et al., 2013), more satisfying to women, and with less intervention and fewer adverse outcomes than standard maternity care (Homer et al., 2001; Kenny et al., 1994; McLachlan et al., 2012; Rowley, Hensley, Brinsmead, & Wlodarczyk, 1995).

Australian policy documents have also recognised continuity of care as a principal objective and key element of contemporary maternity services (NSW Health Department, 2000) by recommending that it is available to all childbearing women (Commonwealth of Australia, 2009). In a recent series of LANCET papers (Homer et al., 2014; Hoope-Bender et al., 2014; Renfrew et al., 2014; Van Lerberghe et al., 2014) the contribution of midwifery to the quality of maternal and infant care, was examined globally. The quality framework that was developed listed continuity as a key element (Renfrew et al., 2014) and midwives were identified as the core professional group to deliver this framework (Homer et al., 2014). However, despite policy recommendations, robust research evidence and a drive from consumers, uptake of models that provide midwifery continuity in Australian settings has been slow (Commonwealth of Australia, 2011).

Defining midwifery continuity

Throughout the literature, a variety of terminology has been used to define continuity in midwifery. Of the three types of continuity (informational, relational and management) it is the *relational* type which is considered to be the most relevant in midwifery-led care models (Homer et al., 2008; Page, 2003). A Cochrane systematic review has also identified *relational* continuity as the type requiring further research in midwifery settings (Sandall et al., 2013).

Midwifery continuity has been defined in government policy, as care across the maternity episode provided by a named midwife whom the woman meets regularly through her pregnancy, who has offered her adequate time for explanation, provided consistency in information, and individualised intrapartum care (Department of Health, 2007). Midwifery researchers have defined continuity as care delivered by the same two midwives in pregnancy, labour, birth and first few weeks postpartum (Barclay, Brodie, Tracy, & Leap, 2002; Waldenström, 1998), or simply fewer carers in pregnancy and a known midwife at the birth (Carolan & Hodnett, 2007). Midwifery continuity has also been defined as care

delivered by a midwife with whom the woman develops a relationship or 'friendship' (Homer et al., 2008; Walsh, 1999).

Women who have experienced midwifery continuity have described it as seeing the same midwife throughout all antenatal visits, labour and the postnatal period (Fereday, Collins, Turnbull, Pincombe, & Oster, 2009). However, a recent investigation into how childbearing women conceptualise midwifery continuity, found that it has a variety of meanings for women including continuity of relationship, staff, information, location and across pregnancies (Jenkins et al., 2014). Midwifery models that provide continuity of care include caseload and team models (Queensland Department of Health, 2012).

Team models of midwifery care

Team midwifery is defined as care received by women from a team of midwives, typically six to eight (Hatem, Sandall, Devane, Soltani, & Gates, 2008). In the team model, midwives see antenatal women on rostered clinic days and when on-call for intrapartum care, and provide community-based postnatal care (Waldenström et al., 2000). The main difference between team and caseload care is that in the team model, responsibility for the care of women is shared equally by all the midwives in the team (Queensland Department of Health, 2012). As the team members share a philosophy of care and there is no named midwife allocated to each woman, the team model provides continuity of care rather than continuity of carer (Homer et al., 2008). As some midwifery teams are greater than the recommended size (up to 20 in some cases) there is less likelihood of women receiving intrapartum care from a midwife who is known to them (Homer, 2006). Lack of continuity of carer also limits the ability of midwives to develop a relationship with women. This is seen as a disadvantage of the team model, whereas the predictability of work hours and less time on-call are seen as advantages for midwives working a roster system (Homer et al., 2008).

The team model has been tested in the Australian setting and the key findings included that women receiving team midwifery care had fewer adverse maternal and neonatal outcomes, rated it as more satisfying than routine care, and that the model was delivered at a cost reduction of 4.5% when compared to standard care (Rowley et al., 1995).

Caseload models of midwifery care

Caseload midwifery is a continuity of carer model. Caseload midwifery is also known as one-to-one midwifery, partnership caseload and sometimes independent or private practice midwifery (Homer et al., 2008). The term 'caseload' is used most commonly in Australia and the UK, where it reflects a model of care that is integrated into established public maternity services (Hartz, Foureur, & Tracy, 2011). Caseload midwifery has been defined as a model of care where women are cared for by a named primary midwife throughout pregnancy, birth and the early postnatal period (Homer et al., 2008). In the caseload model the primary midwife is supported by a small number (2–3) of backup midwives. Primary and backup midwives have their own caseloads of women for whom they are the first point of contact. Caseload midwives who work together in a group (of three to four) are known as a Midwifery Group Practice (MGP) (Homer et al., 2008). Because caseload midwives generally work within the MGP care model, the terms are often used synonymously.

Midwifery-led care research

The most recent international summary of midwifery-led care is the Cochrane systematic review which included 13 trials involving 16,242 women with a combination of low, medium and high obstetric risk factors (Sandall et al., 2013). The review included studies conducted in the public health system in Australia, Canada, Ireland, New Zealand and the UK from 1986 to 2012. Ten team midwifery models and three caseload midwifery trials were included. The review found that women in continuity models were less likely to experience interventions such as amniotomy (see glossary), regional analgesia (i.e. epidural), episiotomy and instrumental delivery, and were more likely to have a known midwife in labour and birth. Of the three caseload RCTs included, 'COmparing Standard Maternity care with One-to-one midwifery Support: a randomised controlled trial' (COSMOS) was the only trial which took place in an Australian setting (McLachlan et al., 2012). The COSMOS trial found that of the randomised women (n=2,314), the women in caseload care (n=1,156) were less likely to have a caesarean section ($p< 0.001$), epidural analgesia ($p= 0.04$) and episiotomy ($p= 0.003$); and were more likely to have a spontaneous vaginal birth ($p< 0.001$). This study was restricted to low risk women and the authors acknowledged that they were unable to identify which active ingredient of the caseload model affected the primary outcome of a reduced caesarean section rate.

The Cochrane review also highlighted the importance of testing continuity in the care of women with identified risk factors (Sandall et al., 2013). It is for this reason that the Midwives at New Group Practice Options (M@NGO) randomised controlled trial, comparing outcomes and costs of caseload midwifery care to standard maternity care for childbearing women of all risk was conducted (S. Tracy et al., 2013). The trial found many statistically significant outcomes including that care received by woman in the intervention (caseload) group (n=871) was as safe and more cost effective, than the care received by women in standard maternity care (n=877). However, the study was unable to explain why a reduction in caesarean section rate (a primary outcome) did not occur. The differentiating factor between the M@NGO and COSMOS trials was that the M@NGO trial included women of all risk status. It is not known however, if risk status explained the difference in caesarean section rates or if the outcomes were due to the way in which continuity was delivered in the M@NGO study. It was within the context of Site 2 of the M@NGO trial that the Case Studies reported in this thesis were conducted.

An earlier Cochrane systematic review of midwifery-led care conducted a sub-group analysis between caseload and team midwifery care (Hatem et al., 2008). The analysis found promising results for neonates, including a statistically significant difference in the treatment effects between subgroups for five minute Apgar score less than 7 (interaction chi-squared =5.62, p= 0.02), and fetal loss and neonatal death at greater than or equal to 24 weeks (interaction chi-squared 5.25, p = 0.02). However, the significance of the analyses of individual subgroups was unreliable due to the small sample size and wide confidence intervals.

Research of caseload midwifery models has found very promising results including lower rates of caesarean and other obstetric interventions, however studies have been limited to descriptive and comparative cohort trials which have included women with varying levels of obstetric risk, and it has been identified that more definitive evidence from adequately powered RCTs, including women of all risk status is needed (Hartz et al., 2011).

The midwife-woman relationship

Having a named carer is thought to enhance continuity to include the *relational* element where care providers have opportunities to develop trusting relationships with their patients (Saultz, 2003). The midwife-woman relationship is a key feature of midwifery continuity

models (Beake, Acosta, Cooke, & McCourt, 2013; Leap, Dahlen, Brodie, Tracy, & Thorpe, 2011; Page, 2003). Processes which support the midwife to develop relationships with women are seen as key principles for sustaining midwifery continuity models (Homer et al., 2008). The quality of the relationships however, will be influenced by the quality of communication between midwives and women, and between midwives and other health care professionals (Hunter, Berg, Lundgren, Ólafsdóttir, & Kirkham, 2008).

In midwifery practice, the phrase 'woman-centeredness' is often used to describe the philosophy of midwifery care which focuses on the midwife-woman relationship (Homer et al., 2009). The term 'woman-centeredness' is also used in midwifery continuity where a woman is placed at the centre of care which aims to offer her choice, continuity and control (Pope, Graham, & Patel, 2001; Sandall, 1995). The term 'with woman' (the literal translation of the word midwife) is also another key phrase used in caseload midwifery practice. An investigation of the 'with woman' concept in contemporary midwifery suggests that the relationship aspect of continuity may hold more relevance for midwives than women, and that it is a midwife's ethos that may matter most to some women (Carolan & Hodnett, 2007). The midwife-woman relationship is thought to be what women value, rather than continuity for its own sake (Green, Renfrew, & Curtis, 2000).

Continuity of care is one of the fundamental components of the 'midwifery partnership' model (a concept developed in New Zealand) where the woman and midwife have an equal and reciprocal relationship (Pairman & McAra-Couper, 2006, p. 250). The 'midwifery partnership' philosophy underpins New Zealand midwifery education, standards and practice (Pairman, 2001).

The influence of setting on midwifery continuity

Midwifery continuity of care takes place in various health care settings, in hospital and community based programmes for example. Aspects of the care setting thought to influence midwifery continuity include support from other maternity professionals, level of midwifery autonomy and hospital priorities (Homer et al., 2008). Several studies have examined the impact of the setting on the delivery of midwifery-led care, particularly in relation to space and place (Fahy & Parratt, 2006; Overgaard, Fenger-Grøn, & Sandall, 2012) and the needs of the institution versus the needs of women (Walsh & Devane, 2012). The delivery of midwifery care in hospital settings has prompted the development of a midwifery theory

known as 'birth territory' (Fahy & Parratt, 2006). The theory is based on an understanding that childbearing women need a safe, private and uninterrupted birthing space within the clinical environment. The midwife is viewed as a crucial 'player' in maintaining the environment (territory) on behalf of the birthing woman. In practice this is achieved through a concept known as 'midwifery guardianship' (Fahy & Parratt, 2006) which involves a degree of gatekeeping by the midwife to manage who enters the birth room and/or has contact with the woman. These gatekeeping behaviours are thought to enhance the labouring woman's confidence and trust in herself and the midwife. It is thought that the desire to maintain birth territory forms part of the midwifery philosophy (Dixon & Foureur, 2010) that is, keeping birth a normal, transformational, social and cultural event (Kemp & Sandall, 2010).

More detail about how midwives work in the caseload model comes from a New Zealand qualitative study of caseload midwives (n=48) in tertiary settings (Davis & Walker, 2010). The study described strategies used by midwives to create an oasis of calm and privacy for women which included pushing the bed aside and dimming birth room lights. The study that was conducted with midwives from across New Zealand including those from the North Island (n=25) and South Island (n=23) offered a seldom-reported perspective on how midwives maintain birth territory in intrapartum care delivery.

A recent Australian exploratory, descriptive study used observation and focus groups with caseload and other midwives to explore their perceptions of birth space and the impact of clinical risk management on practice before and after a move to a new facility (Seibold, Licqurish, Rolls, & Hopkins, 2010). The study involved midwives (n=18) in various roles including graduate year midwives, caseload midwives and hospital midwives working within an urban tertiary hospital setting. Midwives in the study described the birth space in the tertiary environment as being 'owned' by the organisation and that this required them to 'lend' the space to women. The midwives also described concepts such as 'holding the space' or 'providing a bridge' for women. An examination of the midwives views of the birth space after they had moved to the new environment found that the move had made only a small contribution to a birth space where women have a sense of ownership or control. The midwives stated that clinical risk management practices that were in place prior to the move (e.g. strict timelines imposed on women's labour progress) persisted afterwards and continued to impact on their ability to practice autonomously (Seibold et al., 2010). The

midwives all agreed that the environmental improvements were negated by time pressures and high turnover of women that came with the larger facility. The caseload midwives felt that their alibility to provide continuity of carer and build trusting relationships with women during (the antenatal period) would enhance a women's ownership of the birth space to a greater degree than a modified birthing environment.

A recent Queensland study of caseload midwives (n=15) working in a tertiary maternity setting used focus groups to explore their perceptions of what influenced their care delivery (Menke, Fenwick, Gamble, Brittain, & Creedy, 2014). The focus group data revealed how the midwives perceived a lack of organisational support for the caseload model (i.e. providing necessary resources and office space) impacted on their ability to provide care. The study also identified that midwives struggled to protect the birthing space from core midwives and medical staff, as well as their frustration with the frequency of non-evidence based medical interventions (i.e. routine use of electronic fetal monitoring and oxytocic medications for third stage). Midwives' perceptions of staff crowding in the birth room and the amount of unnecessary medical interventions were aspects of care delivery that could have benefitted from being explored further. The recommendation that further research is needed between midwives working in continuity models and other health professionals within the multidisciplinary team supports this notion (Sandall et al., 2013).

The impact of the tertiary setting on midwifery continuity is yet to be fully explored in the research literature. The intrapartum measurements in this Case Study research, i.e. the contact women have with health professionals in the intrapartum period, have the potential to further understand these types of outcomes in caseload care research.

Midwifery continuity measures

The lack of available measurement tools for the different types of continuity (information, management and relational) within midwifery continuity models has been identified as a research gap (Sandall, Devane, Soltani, Hatem, & Gates, 2010).

When models of midwifery continuity were first introduced, evaluation was often required by funding institutions to assess their level of effectiveness. For example the *Know Your Midwife Scheme* in the UK was introduced within the framework of a randomised controlled trial, which allocated women to either continuity of care (n=503) or standard hospital care (n=498) (Flint, Poulengeris, & Grant, 1989). The trial found continuity to be preferred by

women, who felt more satisfied, better prepared for birth and better able to discuss their problems and concerns. Women in the intervention (continuity) group also received less obstetric intervention such as augmentation (see glossary) and intrapartum analgesia, than women in standard care.

The previously mentioned *Changing Childbirth* targets for maternity services in the UK which stipulated that 75% of women should know the person who cares for them during labour and birth, and that 30% of lead professionals should be midwives (Department of Health, 1993) guided early continuity research. Studies measured the numbers of known maternity carers (midwives and medical officers) seen by women in pregnancy (Farquhar, Camilleri-Ferrante, & Todd, 2000; McCourt, Page, Hewison, & Vail, 1998) and at birth (Benjamin, Walsh, & Taub, 2001; Walsh, 1999).

The follow-up Maternity services in the NHS report, found that the targets of 75% of women having a known intrapartum carer, and 30% of women being admitted for birth under the management of a named midwife, had not been achieved (Bosanquet, Ferry, Lees, & Thornton, 2005). The report identified several schemes set up to provide midwifery continuity had ceased to operate. The report went on to speculate that the closures may have resulted from poor retention of midwives who possibly reacted negatively to the impact of being on-call on their personal lives (Bosanquet et al., 2005). The claim however was not substantiated by midwives. Overall recommendations moved away from a focus on the care provider to the decentralisation of maternity services and formation of collaborative networks to make community-based birth a safe option for childbearing women.

An early Australian study of continuity of care in Victorian maternity settings used postal surveys to a large number of women (n=1,616) to examine the level of importance that antenatal continuity held for them (Davey, Brown, & Bruinsma, 2005). The study used Likert scale responses to elicit that being remembered by the maternity carer at each visit meant more to women than continuity of care. The limitation of this study however, was the reliance upon rating responses to predefined questions to draw conclusions about what aspects of maternity care women valued more highly. It was also reliant upon women's recall of their antenatal care six months after birth. The study did not report why women rated 'feeling remembered' by their carer higher than continuity. However, one could argue that outside the context of continuity that 'feeling remembered' would be unlikely. A limitation of this study was the under-representation of young women, women from non-

English speaking backgrounds, and publically funded women in survey responses. Additionally, the variation in maternity care models provided (n=6) included care by obstetricians and GPs, which limited the application of these results to midwifery continuity models to the few that were available in Victoria at the time. More robust studies focusing on midwifery continuity of care have since been undertaken and are presented later in the literature review.

Relational continuity

In order to more fully examine the relational aspects of midwifery continuity, qualitative studies are required to complement the available quantitative evidence (Huber & Sandall, 2009). For this reason several qualitative studies of midwifery continuity have been conducted.

One of the first studies was a four-part ethnographic study evaluating the introduction and ongoing processes of a midwifery continuity programme known as the One-to-One scheme, which commenced at a London-based maternity hospital in 1993 (McCourt et al., 1998). The first phase of the study involved an evaluation of women's responses to care when receiving continuity of carer. The study compared focus group and interview data for women in the continuity model (n= 728) to women who received standard care (n=675). The study was able to elucidate that women were more satisfied with the continuity model. It also highlighted that women placed importance on being able to rely on their named midwife for information giving and advocacy (McCourt et al., 1998). A later phase of the study used observations and interviews with midwives (n=30) to ascertain what working in the caseload model meant to them (Stevens & McCourt, 2002). An aspect of caseload care highlighted by the midwives was their need to develop personal and professional boundaries with women regarding non-essential overnight contact. The study outlined how caseload care was organised in general, however a more detailed description of the model would have assisted in establishing a link to study outcomes, especially in regard to the on-call component and amount of overnight contact midwives had with women. Another evaluation of the same One-to-One midwifery programme, noted how midwives felt that carrying mobile phones enabled greater flexibility for them and ease of access for women (Page, 2003).

A further study from the One-to-One continuity model conducted in a South London community setting, involved interviews with women (n=10), six of whom had experienced a

non-continuity of midwifery care model in a previous birth. The study also included observations of antenatal consultations and interviews with midwives (n=4) (Huber & Sandall, 2009). The study explored what women understood by 'knowing' their midwife in that it was associated with both parties having time to learn about each other's expectations. The authors went onto describe how women's feelings of familiarity with their midwife led to reduced uncertainty about pregnancy and birth. The study highlighted how the continuity of carer model allowed the time for midwives and women to get to know each other and develop a relationship, and how this acted as a vehicle for women feeling calm and free of anxiety. Study outcomes however were only applicable to multigravid women.

Studies of caseload care have also included a focus on continuity within the context of MGPs. One of the first documented evaluations of the MGP model compared outcomes of women receiving care through a MGP, to women receiving standard maternity care provided by the same central London (UK) hospital (Sandall, Davies, & Warwick, 2001). The evaluation revealed that women enrolled in MGP who received care in labour from one or more midwives they knew well (92%), used less pain relief in labour. As this outcome required further exploration, a study involving semi-structured interviews with a sample of women (n=10) from the caseload group was carried out. Women reported how knowing the midwife who was going to be with them in labour provided a feeling of comfort and ease for them (Leap, Sandall, Buckland, & Huber, 2010). This research suggested a direct link between women knowing their midwife prior to labour and birth and their ability to overcome the fear of intrapartum pain.

In part one of an Australian evaluation of caseload midwifery, questionnaire responses from women (n=84) were used to assess their satisfaction within the continuity of carer model (Collins, Fereday, Pincombe, Oster, & Turnbull, 2010; Fereday et al., 2009). The study, which included women of all obstetric risk who had experienced MGP care at a tertiary maternity facility, made a direct link between the 24-hour telephone access provided through continuity of midwifery care and women's satisfaction with care delivery. Part two of the study used surveys which included Likert scales and two open-ended questions to evaluate the satisfaction of caseload midwives (n=15) working in two MGPs that had six midwives in each; which is higher than the usual number of two to four midwives in Australian MGPs (described previously). A content analysis of the open-ended questions identified continuity of care as a common theme. Continuity however, also featured in responses about what

midwives liked, and did not like, about their role. Positive responses to continuity were linked to the rapport midwives had with women, whereas negative aspects included not being present for the birth of women they knew or attending the birth of women they had not met previously. The outcome was possibly due to the higher number of midwives (n=6) in the group. The processes in place for midwives to meet women antenatally and attend women in labour however were not described.

Studies which have examined continuity in caseload care from the midwives' perspective include an ethnographic and phenomenological study in the UK which used a combination of observation and interviews with women (n=5) their partners (n=5) and midwives (n=5) to explore the role of the 36 week antenatal talk on 'preparing for birth' (Kemp & Sandall, 2010). This study identified how continuity of care involved the midwives setting ground rules for being contacted by women in labour. The concepts of continuity of care and trust however were difficult to grasp without knowing more about the context of antenatal and intrapartum care delivery in this study. Similarly an Australian study which examined how MGP midwives (n=17) managed work-life balance, identified that midwives set boundaries with women about when to contact them (Fereday & Oster, 2010). However, a more detailed description of the on-call processes within this MGP was needed to fully understand how this outcome occurred.

Summary

Current research into continuity in midwifery care has provided valuable evidence about the topic, in particular the positive impact on outcomes such as preterm birth (Sandall et al., 2013) and caesarean section (McLachlan et al., 2012). Outcomes differed across studies, settings and countries with variances in how continuity was delivered within the different models. However, in many cases a detailed description of how continuity was provided or was related to the study outcomes was either unclear or not stated. Specific outcomes that can be monitored or reported in any setting could enable a greater knowledge about which of the active ingredients of midwifery continuity are most important and how they are making a difference to outcomes.

The next section of the literature review focuses specifically on the literature related to Case Study One – women's contact with health professionals in the intrapartum period.

Case Study One – women's contact with health professionals in the intrapartum period

This Case Study explored specific aspects of intrapartum care received by women of all risk status in caseload midwifery care, compared to women receiving standard maternity care.

Background literature: Intrapartum continuity of carer

An important aim of the caseload midwifery model is for the primary or backup midwife to provide supportive, continual and individualised intrapartum care to women, where all three elements of continuity (information, relational and management) are provided. *Relational* continuity however, is seen as the key intrapartum element as it facilitates the others to occur (Leap et al., 2010). Relational continuity is thought to be associated with the creation of calm (freedom from anxiety) in labour and birth (Huber & Sandall, 2009) and has also been associated with a reduced need for intrapartum pain relief (Leap et al., 2010). The philosophy of caseload midwifery practice supports the notion that relational continuity and a reduced number of intrapartum carers will limit interruptions to the labouring woman and possibly enhance physiological birth processes (Teijlingen, Hundley, Rennie, Graham, & Fitzmaurice, 2003).

Women have reported a higher degree of satisfaction with fewer intrapartum carers (Fereday et al., 2009). However, when women are cared for in caseload models where they labour and birth in a hospital (as opposed to at home or in a birth centre) it is possible that they will receive care from hospital staff, including core midwives and medical staff as needed. Women in the caseload model may also receive care from midwifery and medical students if the hospital is affiliated with a student teaching programme, although it could be argued that this can occur in any setting. An early UK study which included women of low obstetric risk status, used surveys to measure women's contact with intrapartum carers in a midwifery-led maternity unit, compared to a typical labour ward (or birth suite). The study found that although women in the midwifery-led unit (n=1616) had greater continuity of intrapartum carer and saw fewer medical staff than women in the labour ward (n=760), both saw the same number of midwives overall (Hundley, Milne, Glazener, & Mollison, 1997). The number of health professionals seen by caseload women of all risk in the intrapartum period has not been previously reported and has been conducted in this research.

Having the same midwife continuously present in the intrapartum period is thought to enhance the quality of interactions between women and midwives (Lundgren & Berg, 2007; Walsh & Devane, 2012). The time that core midwives spend with women in the intrapartum period may be influenced by the need for her to attend to other women in the birthing area at the same time. This is in contrast to the caseload midwife who generally attends the birthing suites to provide intrapartum care to one woman from her caseload. Work agreements, which apply to all employed midwives and institutional time constraints (that exist in large-scale pubic maternity facilities) also have the potential to impact on the time that midwives spend with women in the intrapartum period. Birthing care in institutions where such time constraints exist have been likened to a processing-type environment (Walsh, 2006). Midwives who have worked in both primary and tertiary units have reported feeling more time pressured in the tertiary setting compared to community-based primary care areas (Davies, 2011). The time that caseload and standard midwives spend with women of all obstetric risk is yet to be examined in the research literature and has therefore been included in this study.

Intrapartum presence of a known midwife

The presence of known midwife in labour and birth has been used as a measure of midwifery continuity since the *Changing Childbirth* report recommended 75% of women should have a known midwife at birth (Department of Health, 1993). It has since been identified that the evidence to support this initial recommendation was unclear and that assessing 'known' carers as a single outcome measure for continuity is problematic (L. M. Freeman, 2006). It is difficult to assess what is meant by 'known intrapartum carer' as it may be interpreted differently by different women. It has been suggested that having met a midwife once antenatally may not be sufficient for women to form a trusting and meaningful relationship with the midwife who cares for them in labour and birth (Green et al., 2000). Measures of known intrapartum carer do not always clarify if it is a doctor, midwife, medical or midwifery student. Furthermore, if the carer was known to the woman antenatally it is not often explained how this was achieved. The measure of known carer at birth also fails to recognise the time that carers spent with women throughout the labour. The lack of agreed indicators (or data item) for known intrapartum carer in Australia and internationally, makes this outcome difficult to measure and report.

The presence of a known midwife during the intrapartum period in the caseload model has been examined in two Australian randomised studies (Homer et al., 2001; McLachlan et al., 2012). The St George Outreach Maternity Project (STOMP) tested the team midwifery model (Homer et al., 2001) while the aforementioned COSMOS trial focused on the caseload midwifery model of care for low risk women (McLachlan et al., 2012). The STOMP trial reported that despite efforts to host several 'meet the midwives' evenings not all women met all of the midwives in the team prior to birth. The COSMOS study reported high intrapartum presence of primary or backup midwives (90%) however it did not report if women had previously met the backup midwives who cared for them in labour and birth (McLachlan et al., 2012).

A study in the Netherlands examining intrapartum interventions, measured the attendance of a known midwife at the births of low risk women (n=178) across several midwifery practices which varied in size (1-2, 3-4 and 5 or more midwives) (Fontein, 2010). The study defined a known midwife as either a midwife whom the woman said she had known from the practice or had met prior to attending them at birth. Study findings concluded that the presence of a known midwife at birth was proportionate to the practice size (i.e. the smallest practice had the highest percentage of known midwife at birth). The study found that practices with a maximum of two midwives had the lowest intervention rates however, overall study numbers were small.

The Cochrane systematic review found that women allocated to midwife-led continuity models of care were more likely to be attended at birth by a known carer (Sandall et al., 2013). However, the review concluded that further research is needed to ascertain if the reduced birth intervention and higher maternal satisfaction that is seen in midwifery-led models where there is a known birth carer, can be attributed to the continuity model or if it is linked to the quality of the woman-care provider relationship. The review goes on to recommend further research in midwifery-led models which offer a high a degree of relational continuity.

Intrapartum vaginal examinations

The vaginal examination is an intrapartum procedure that has been associated with women's emotional distress and pain (Carlsson, Ziegert, Sahlberg-B., & Nissen, 2012; Lewin, Fearon, Hemmings, & Johnson, 2005b), loss of dignity (Morad, Parry-Smith, & McSherry, 2013)

and potential infection (Dixon & Foureur, 2010; Maharaj, 2007). The routine use of vaginal examinations for the assessment of labour progress highlights it as a procedure with the potential to affect the childbearing women's emotional wellbeing, which has been identified as an area maternity care in need of further research (Sandall et al., 2013).

A Scandinavian study (Sandin-Bojö, Larsson, & Hall-Lord, 2008) which used World Health Organization (WHO) classifications of women's perceptions of intrapartum care, listed the vaginal examination as a practice which is frequently used inappropriately. The study found that 40% of women reported having had more vaginal examinations than they thought were necessary during labour and birth. Other studies which examined women's experiences of intrapartum vaginal examinations found that some women felt unable to decline the procedure, or that they received a poor explanation beforehand, or did not recall having consented (Lewin, Fearon, Hemmings, & Johnson, 2005a). In the Australian context, a state-wide survey of women having babies in Queensland found that the majority of women (92.6%) had at least one vaginal examination during their labour, but that only 11.8% of women recalled making an informed decision to undergo the procedure (Miller, Thompson, Porter, & Prosser, 2011).

Vaginal examinations are a highly subjective measure with accuracy rates of around 48% (Tuffnell, Johnson, Bryce, & Lilford, 1989). However, the measure is thought to be less variable where there is continuity of intrapartum carer as inconsistency is lessened (Incerti et al., 2011). Despite evidence reporting the inaccuracy of the procedure, the intrapartum vaginal examination to measure cervical dilatation, is considered to be the gold standard for assessing labour progress (Shepherd et al., 2010). Therefore routine (four hourly) vaginal examinations remain policy in many places including Queensland, Australia (Queensland Maternity and Neonatal Clinical Guidelines Program, 2012). The vaginal examination has become such a routine part of intrapartum care delivery it is often viewed as just another clinical procedure rather than an intervention with the potential to cause harm, which for this reason, can often go undocumented (Dixon & Foureur, 2010). The potential for inter-observer variability (Royal College of Midwives, 2012) makes the vaginal examination an inherently imprecise measure. Its value as a primary method for labour assessment is therefore considered debatable (Davies, 2011). The reliance upon the vaginal examination as an intrapartum measure is thought to reflect a medically dominant view of management in labour and birth (Burvill, 2002; Walsh, 2010).

A Cochrane review which included two RCTs of vaginal examinations for assessing labour progress, concluded there was no evidence to reject or support the routine use of intrapartum vaginal examinations (Downe, Gyte, Dahlen, & Singata, 2013). The review recommended that further observational studies that provide more information about the context of labour, in varying settings and populations should be conducted, as well as large scale RCTs that are triangulated with qualitative data reporting women's experiences. The review also suggested rigorous testing of non-invasive assessment tools for labour assessment. This includes observation of the 'purple line' which rises up from the anal margin between the buttocks as labour progresses (Davies, 2011). This measure is rarely used, or recorded as being used, in practice. A longitudinal study with observations of women (n=144) from admission in labour through to final vaginal examination, found that the purple line was visible at some point in labour for 76% of women (n=109) (Shepherd et al., 2010). It also found a positive correlation between length of the purple line, cervical dilatation, and descent of the presenting part.

A further UK study aimed at defining normal labour progress in low risk multiparous women (n=403) found the vaginal examination to be an unreliable predictor of progress due to the multifaceted and complex mechanisms of labour (Lavender, Hart, Walkinshaw, Campbell, & Alfirevic, 2005). Plotting individual women's progress along a prescribed pathway (partogram which contains set parameters for labour progress) has been criticised for failing to consider variation among women (Walsh, 2010). The possibility for misdiagnosis of labour progress and inappropriate interventions also exists (Gross et al., 2009), with the potential to increase maternal and infant morbidity (Bugg, Stanley, Baker, Taggart, & Johnston, 2006).

The prevention of unnecessary intrapartum interventions is fundamental to the midwifery philosophy, where a woman births without interference (Davies, 2011). In this study the frequency of vaginal examinations was selected as an outcome measure of midwifery continuity and is based on the following research: i) that knowing women prior to labour allows caseload midwives to make a behavioural assessment of the woman's progress rather than having to perform a vaginal examination (Cheyne, Dowding, & Hundley, 2006); and ii) that caseload midwives hold a greater normal birth philosophy and act more autonomously (Walsh & Devane, 2012) and iii) the assumption that caseload midwives may use a wider range of methods to assess labour progress compared to midwives in standard care.

The practice of intrapartum vaginal examinations is thought to be influenced by a combination of factors, including health professionals' personal preferences, the environment (hospital or home), the institution's policies and guidelines, the need to determine a woman's labour stage and progress (Cheyne et al., 2006). The frequency of intrapartum vaginal examinations to assess the labour progress of women is an area of midwifery practice that is currently under-researched and has not been previously reported in caseload care. As the association to continuity of midwifery carer is unknown, the outcome was deemed a relevant measure for inclusion in this study.

The next section of the literature review focuses specifically on the literature related to Case Study Two – communication modalities in caseload midwifery

Case Study Two – communication modalities in caseload midwifery

The second Case Study explored the modes and frequency of communication, including mobile technologies, used by caseload midwives and women in the antenatal and postnatal period.

Background literature: Mobile technologies in maternity contexts

Research into mobile technologies in maternity contexts has generally focused on health promotion and access to treatment for childbearing women in the developing world (Chib, 2010; Lund, 2010). The use of mobile technologies was considered vital to the achievement of the Millennium Development Goals targets (4, 5 and 6) aimed at improving maternal health and reducing child mortality globally (Cole-Lewis & Kershaw, 2010; Sloninsky, 2008; Tamrat & Kachnowski, 2012). The use of mobile technologies in maternity contexts in Australia has mainly focused on health promotion or access to treatment for rural and remote Aboriginal and Torres Strait Islander women (Coomealla Health Aboriginal Corporation, 2009).

In the UK and New Zealand, literature surrounding the use of mobile technologies in nursing and midwifery practice is mostly located in policy and educational documents. A UK Royal College of Nursing report has released best practice guidance for text messaging, which recommended that a high level of governance exist around its use (RCN, 2006). The report also recommended that aspects of care delivery involving mobile phone use and texting should consider issues related to documentation, informed consent and the unique

needs of children and young people. Guidelines for texting practice have also been included in the New Zealand Midwifery Council Code of Conduct (Midwifery Council of New Zealand, 2010). The Nursing and Midwifery Council (UK) lists the 'ability to text' as an essential communication skill for midwifery qualification and entry to the midwives register (Nursing and Midwifery Council, 2009). Policy documents from the equivalent Australian agencies including the Australian College of Midwives (ACM) and the Australian Health Practitioner Regulation Agency (AHPRA) were examined using key words 'SMS, 'texting' or 'mobile phone'. However, there was no reference made to the use of mobile phones in midwifery practice.

Mobile technologies in caseload midwifery

The use of mobile technologies to facilitate communication between midwives and women in caseload care is not well researched in MGP models (Forti, Stapleton, & Kildea, 2013). In standard maternity care, texts are mostly used for appointment reminders or to provide information to women (Cormick et al., 2012). Studies measuring and defining continuity have been criticised for failing to acknowledge the level of contact and support women receive from texts and emails within continuity models, as this may contribute to provision of continuity of care (Green et al., 2000). Having 24-hour access to a named midwife is a unique feature of the caseload model of care, which women report as being popular (Page, 2003) and reassuring (Fereday et al., 2009; Stevens & McCourt, 2001). Email communication is another recognised mode of contact between women and midwives in the caseload model (Johnson, Stewart, Langdon, Kelly, & Yong, 2003) however its use is limited to those with access to smart phones or personal computers.

A study of midwives' satisfaction with caseload care suggested that the impact of mobile phone calls on midwives' personal lives may lead to dissatisfaction in their role and hinder recruitment and retention to the model (Collins et al., 2010). As this study did not describe the organisation of midwifery care surrounding the phone call contact, it is unclear if the phone calls were initiated by the women, or what time the contact occurred, and was difficult to ascertain how phone contact was linked to dissatisfaction.

The potential for caseload midwives to conduct clinical consultations via mobile phone has medico-legal implications regarding confidentiality, accountability and documentation (Baker, 2006) however, the purpose for which mobile technologies are used in caseload care

is largely unknown. The lack of governance surrounding the use of mobile technologies in the Australian caseload midwifery setting leaves this important aspect of midwifery continuity of care under-researched and in need of further exploration. Hence, this is an important aspect of this study.

Summary

The effectiveness of continuity of midwifery care has been widely reported in research. However, due to a lack of definitions that enable measuring and monitoring of midwifery continuity, exactly how continuity works is left unexplained. The research literature indicates that as a complex intervention, a greater understanding of the causal mechanisms within midwifery continuity is needed in order for care outcomes to be better understood. Aspects of continuity of midwifery care that were highlighted in the literature requiring further investigation included details of intrapartum care delivery by health professionals, and the modes of contact between midwives and women in the antenatal and postnatal period. These research gaps were addressed through two Case Studies, which are detailed in the next chapter. Providing detail like this will possibly allow replication or even comparison between midwifery models in different locations.

Chapter Three: Methodology and Methods

Introduction

This chapter provides details of the Case Study methodology used to address identified gaps in the research literature. Both Case Studies took place in the same tertiary maternity facility setting examining the single model of caseload midwifery care. As each Case Study addressed specific aspects of midwifery continuity in the caseload model, different methods were used, which will be described separately.

Case Study One was a sub-study nested within the M@NGO RCT, which compared intrapartum continuity of care in caseload midwifery to standard maternity care.

Case Study Two used a descriptive observational design to explore the modes of communication used by midwives and women during the antenatal and postnatal period in a caseload midwifery model of care. A diagrammatic overview of the research can be seen below (Figure 1).
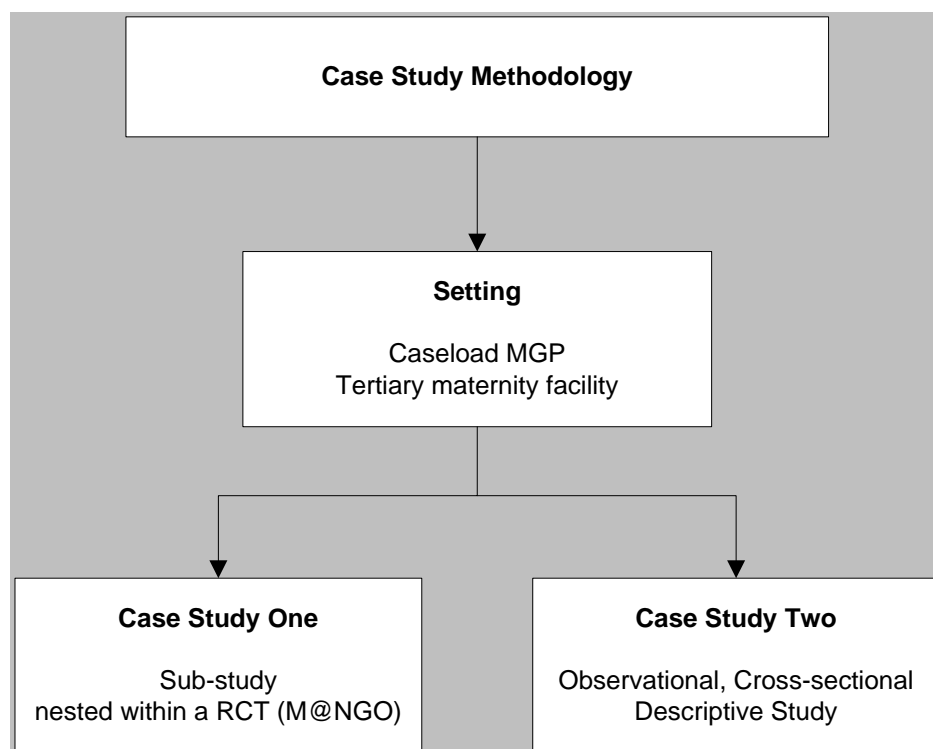
Figure 1: **Diagrammatic overview of the research**

Case Study Methodology

The Case Study approach is commonly used in situations where the main questions are 'how' and 'why' (Yin, 2003), as was the case in this research. Case Study has been defined as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 1994, p. 13). In combining different ideas around what a Case Study is, the 'case', as the object of the Case Study, should "be a complex functioning unit, be investigated in its natural context with a multitude of methods and be contemporary" (Johansson, 2003, p. 2).

Case Studies are often thought to pertain to an individual or enterprise, however a 'case' can be any bounded system (i.e. an institution or programme) where the 'case' is used as a host to bring many functions and relationships together for study (Stake, 2013). Case Studies can be used to test a hypothesis (Stake, 1978; Yin, 1981) though they are more often more qualitative in nature. Case Studies can be designed to capture specific details of a particular group relevant to the purpose of the study by using multiple sources of data which are clearly formulated, narrow and researchable (The University of Melbourne, 2010).

There is some debate as to whether Case Study is a method or methodology (Denzin, 2009; Gerring, 2007; Meyer, 2001; Yin, 2003). It has been suggested by Yin (1994) that where the research design incorporates a specific approach to data collection and analysis it can be considered an all-encompassing method. When used as a methodology, Case Studies have a broader application and research approach (Luck, Jackson, & Usher, 2006) in which different methods are combined to explore phenomena from different angles, allowing triangulation of overall findings (Johansson, 2003). The methodology approach allows the topic of interest (in individual cases) to be the focus of the Case Study rather than the methods used (Meyer, 2001).

As Case Study research is not limited to single sources of data, the term 'case study' can refer to either single or multiple cases. The type of Case Study (single or multiple) is chosen depending on the need and context of the study. The advantage of multiple-case studies includes the ability to complete the full cycle of research (i.e. design, selection, analysis and reporting) with more than a single case, which is thought to make the research more robust (Herriott & Firestone, 1983). In some fields (i.e. anthropology and political science)

multiple-case studies have been considered a different 'methodology' than single-case studies. The multiple-case study approach was chosen for this research in order to obtain data pertaining to both service users (childbearing women) in Case Study One and service providers (caseload midwives) in Case Study Two.

Case Studies may also be analysed in single (holistic) or multiple (embedded) units or themes (Yin, 1994). A holistic design examines the global nature of the phenomenon, whereas an embedded design focuses on the subunit(s) of a case (Meyer, 2001). A single (holistic) unit of analysis was chosen for this research as both Case Studies obtained data from the same setting and involved the same research topic.

Case Studies are thought to have strong internal validity, however due to their specific focus and often smaller sample sizes, external validity (i.e. how well the data can be applied to more general situations) is reduced (Trochim, 2006). The power of the Case Study however, lies in its focus on the local situation, where greater emphasis is placed on particularisation than on generalisation (Stake, 2013). Other limitations include a potential lack of independence in cases, which can underestimate the strength of the relationship between the independent and dependent variables (George & Bennett, 2005). Furthermore, the adaptability of Case Studies, which allow design and data collection procedures to be tailored to the specific research question(s), may become a limitation if clear design choices are not made and articulated from the outset (Meyer, 2001). As Case Studies are often both a process of inquiry about a 'case' and a product of that inquiry, maintaining an emphasis on the binding concept or idea, is essential (Stake, 2013). Details of the methods employed in each of the Case Studies are described separately below.

Case Study One

Aim

The aim of Case Study One was to examine the intrapartum care provided to women in a caseload midwifery model compared to standard maternity care, to identify possible differences in care delivery.

Objectives

The objectives of Case Study One were to measure and report the:

- Number of health professionals seen by women during the intrapartum period in the caseload model compared with women receiving standard maternity care
- Proportion of women in the caseload model who received intrapartum care from their primary midwife or backup midwife whom they had met antenatally
- Length of time health professionals spent with women in the intrapartum period in caseload care compared with standard maternity care
- Number of intrapartum vaginal examinations recorded for women receiving caseload care, compared with women in standard maternity care.

Design

Case Study One was a sub-study nested within the M@NGO RCT. The rationale and design for the M@NGO trial have been described in the study protocol (S. K. Tracy et al., 2011) (Appendix 9), however a brief overview follows. The M@NGO trial was a multi-centre, two arm, unblinded, randomised controlled parallel group trial, designed as the world's largest RCT comparing costs and outcomes for women of all obstetric, medical and psychosocial risk: receiving caseload midwifery care compared with standard maternity care (S. Tracy et al., 2013). The sample size was selected *a priori* to enable it to be powered for its primary outcome – a reduction in the proportion of women undergoing caesarean section (from 29% to 23%). The M@NGO trial was conducted at two sites – Site 1 was in Sydney (NSW) and Site 2 was in Brisbane (Queensland). The trial commenced at Site 1 in Dec 2008 and at Site 2 in June 2010. The study ceased at both sites on 31 May 2011.

Case Study One was conducted at Site 2 of the M@NGO trial (Figure 2). It provided a unique opportunity to study the caseload midwifery model in more detail and to explore how the intervention (caseload care) worked, and why it may have had a particular effect (Golding, 2009).
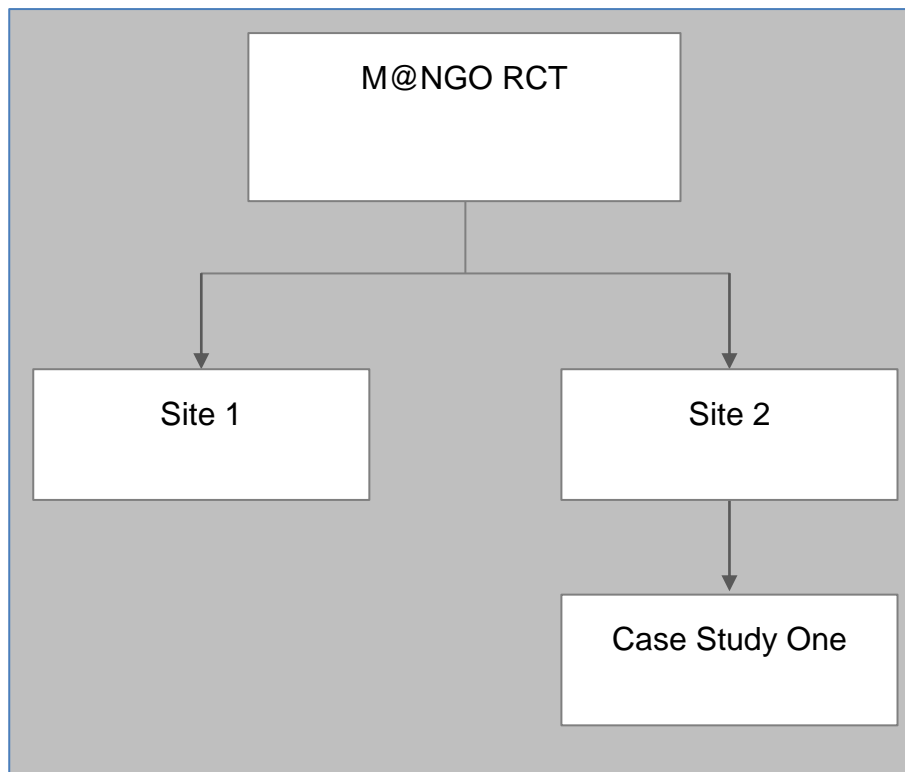
Figure 2: **Diagrammatic overview of the relationship between the M@NGO RCT and Case Study One**

The Randomised Controlled Trial Design

This section describes the RCT design in which the Case Study was nested. The RCT is the most powerful experimental design for testing cause and effect relationships (Polit & Beck, 2010). It is considered the gold standard for assessing treatment effectiveness in healthcare interventions (Newell & Burnard, 2011). Randomised controlled trials are highly rated on the evidence hierarchy, second only to systematic reviews (Polit & Beck, 2010). This rating is due to their ability to yield an estimate of the effect that is unbiased and consistent, which is rare among other study designs (Clay, 2010). In RCTs, randomisation is used to assign participants to either a treatment or a control group and thus to minimise selection bias so that only existing baseline differences in treatment groups are similar, and unlikely to be the cause of study outcomes. Limitations of RCTs include that they are time consuming and expensive and may lack external validity (or generalisability) (Rothwell, 2005) and that they often require large samples to demonstrate effect size in order to achieve statistically significant results.

Sub-study Design

Nesting sub-studies within RCTs have increased in popularity in recent times as they are considered a robust and pragmatic alternative to observational studies (Sorich, Rowland, &

Wiese, 2014). Sub-studies are used for the collection of data for additional study objectives which remain consistent with hypotheses and aims of the main study protocol (George Washington University, 2013). The benefit of RCT nested sub-studies is that they include randomisation of participants, which reduces selection bias (Hammond, Malec, Nick, & Buschbacher, 2015). Sub-studies also benefit from being able to use the same protocols and procedures from the main study to explore specific or additional outcomes and subgroups but without the cost associated with conducting an independent trial (Friedman, Furberg, & DeMets, 2010).

When sub-study outcome measures are put in place *a priori* (see glossary) the possibility that the findings are due to chance is further reduced (Richesson & Andrews, 2012). A limitation of sub-studies however, is that their sample size is often not large enough to be adequately powered for the main study outcomes. A *post hoc* power analysis can however be conducted after the experiment, to validate sub-study findings (Thabane et al., 2013). The following information details important methods relating to Case Study One: the M@NGO sub-study conducted at Site 2 (Brisbane).

Setting

The setting was a tertiary maternity hospital in an urban area in Queensland, Australia. Hospital statistics from the year prior to the study (2009) showed that 9,260 women birthed their babies at the facility, of whom 51% (n= 4,764) were cared for in the public system. The remainder of women were admitted under private maternity care.

Standard antenatal care was provided to women in the public system by midwives, obstetricians and general practitioners where shared responsibility for care was arranged. Options for public maternity care also included access to specialist services for women with significant risk factors. Community-based care was available for women with no identified risks in pregnancy. In the study setting, continuity of midwifery carer was only provided to women (with no identified risk factors) through the MGP model. Factors that differentiated caseload midwifery and standard care are tabled in the main study report (S. Tracy et al., 2013) (Appendix 9).

Prior to the M@NGO trial, the caseload model (within MGPs) had been in operation since 2006 and was available to approximately 17% of publically-funded, low risk women. As women with identified risk factors were unable to access the MGP model, their maternity

care was managed by the relevant specialist. Consultation with midwifery managers and obstetricians prior to the trial commencing permitted the MGPs to be changed from a low risk to an all risk model for the purposes of the trial. Therefore on commencement of the trial, women in the MGP model who had, or developed, obstetric risk factors, remained under the care of a caseload midwife, supported by the named specialist or obstetrician allocated to the MGPs.

The MGPs were located in five community settings within the hospital's catchment area. One of the MGPs was located centrally (nearer the hospital) to service the needs of young women (21 yrs. and under) from across the catchment. All five MGPs employed the same number of midwives (n=4) working in a full-time capacity (Allen et al., 2012).

Participants

Case Study One included participants at Site 2 (n=420) of the M@NGO RCT (Figure 2) and eligibility criteria included women who were:

- Booked for maternity care at the public hospital
- Less than 24 weeks pregnant
- Pregnant with a single, live fetus
- Aged 18 years or older at time of booking.

Women were excluded if they were:

- Unable to consent e.g. had serious mental illness or intellectual impairment
- Living outside the hospital catchment area
- Planning a caesarean birth at booking
- Diagnosed with a multiple pregnancy at booking
- Under medical management for complex pre-existing conditions e.g. poorly controlled insulin-dependent diabetes and thyroid disorders, women with a BMI >40 and women with identified drug and alcohol management needs.

Intervention in the M@NGO trial: Caseload midwifery care

Women in the intervention group (caseload) were allocated to a primary midwife and a specific MGP. In the event that the primary midwife was unavailable (i.e. she was off duty, on leave, or with another woman in labour) one of the three backup midwives would care for

the woman in her absence. If the primary midwife was caring for a woman she was concerned about, she would collaborate with the named obstetrician during weekly case conferences that were arranged for this purpose or through the on-call consultant in Pregnancy Observation and Assessment Unit (PAOU) 24 hours/day if required.

Women usually received their first antenatal (booking) visit in their home at around 10–14 weeks gestation. The remainder of antenatal care was provided in a community setting where the primary midwife and her (three) caseload colleagues were generally in attendance, if their schedules permitted. Antenatal visit sessions were delivered in a group format. This type of antenatal care was based on the Centering Pregnancy model (J. Reid, 2007). At each antenatal visit, women had their routine pregnancy checks away from the group, which they joined later for an education session. The aim of the group format was for woman to learn from, and experience their pregnancy with, other women of a similar gestation. This approach to antenatal care also aims to provide women with an opportunity to meet all of the midwives in the group practice during their pregnancy (Mater Mothers' Hospital, 2006).

All women in caseload care were required to birth in the tertiary hospital as neither home birth or birth centre care was available at the study site. At the onset of labour, women were asked to telephone their primary midwife and arrange to meet at the hospital for intrapartum assessment and/or admission to birthing suites.

In the study setting, the caseload midwives were not responsible for care on the postnatal ward although they were able to visit women from their caseload during this time. Unless they were unwell, women and their infants were discharged home under the care of the caseload midwife after the minimum required hospital stay of four hours. Women receiving caseload care were able to receive home visits from their primary or backup midwife for up to six weeks following the birth. Upon discharge from the caseload service, the midwife referred the woman to her GP and/or child health nurse for ongoing care. Referrals to other services (i.e. lactation consultants, physiotherapists) were made as required.

While in the caseload model of care, women were able to make contact with their primary midwife 24 hours a day by calling or texting their mobile phone or by sending an email. When the primary midwife was off-duty the woman's call was received by a backup midwife from the same MGP. Hospital policy stipulated that when MGP midwives were off-

duty they diverted incoming mobile phone calls to their group practice partners and switched their phones off.

Each midwife's caseload contained approximately 50% multiparous and 50% primiparous women and all MGP midwives worked full-time, providing care to around 40 women over a 12-month period. The annual caseload for midwives in the Young Women's MGP however was 36, due to a higher number of young women with additional psychosocial needs. Apart from designated group antenatal clinic days, each midwife organised their own caseload and did not accept women due to birth when they had leave planned. Midwives worked 10 days per fortnight and when they were on-duty (10 out of 14 days) were on-call 24 hours a day. The maximum number of hours a MGP midwife could work per day (12 hours) is legislated and "rest breaks are to be taken between the third and sixth hours on-duty with a second meal no later than the tenth hour of duty" (Queensland Department of Health, 2012, p. 32). Midwifery care was delivered according to the same hospital guidelines and protocols that applied to all midwives caring for women at the study site.

Control: Standard maternity care

Women allocated to the control group (standard maternity care) received hospital or community-based antenatal care provided by hospital midwives and obstetricians, or combined GP and hospital care (GP shared-care). All women (including those with low risk) saw an obstetrician twice during pregnancy and had other referral consultations as necessary. Antenatal consultations were provided by hospital staff that were typically unknown to women and antenatal care providers did not provide intrapartum or postnatal care. Core (rostered) midwives cared for women attending the hospital for antenatal complications, labour, birth and postnatal care. Women received an average of two visits from midwives through a postnatal home-care service, which was offered to all women who resided within the hospital's catchment area. Women were then discharged to the care of the GP and child health service, usually within two weeks following birth. All care was provided according to the same hospital guidelines and protocols as for women in the intervention (caseload) group. Women were able to contact a midwife at the hospital 24 hours a day by calling the PAOU for advice and support. If required, they were invited to attend the hospital for an assessment.

Outcome measures

Baseline demographic data were collected for all participants and included age (years), parity (multiparous or primiparous), identified medical, obstetric or psychosocial risk at labour onset, and pre-pregnancy Body Mass Index (BMI). A Socio-Economic Indexes for Areas (SEIFA) score was also obtained. This is a scale developed by the Australian Bureau of Statistics which ranks areas in Australia according to relative socio-economic advantage and disadvantage (Australian Bureau of Statistics, 2014). Hence, the SEIFA score denotes the level of social and economic wellbeing, with one being the lowest and ten representing the highest level of socio-economic advantage. Medical, obstetric and psychsocial risk factors were also assessed and categorised according to the criteria developed by the Australian College of Midwives in the National Midwifery Guidelines for Referral and Consultation publication (Australian College of Midwives, 2008) (see glossary).

Outcome measures that were unique to Case Study One were defined *a priori* and are outlined below.

Primary outcome

The number of health professionals who were documented in the woman's medical record as providing intrapartum care to women.

Hypothesis

There will be a lower number of health professionals seen by women during the intrapartum period when comparing women who receive caseload midwifery to those receiving standard care.

Secondary outcomes

The secondary outcomes were:

- The number of women in the caseload group who received intrapartum care from their primary midwife, or back-up midwife whom they had met antenatally
- The amount of time health professionals spent attending women throughout the intrapartum period, measured in 15-minute increments in both groups
- The number of vaginal examinations recorded for women in both groups during the intrapartum period.

Randomisation and masking

The randomisation schedule was prepared by a researcher not involved with treatment allocation and a telephone-based computer system provided by the NHMRC trial centre was used. Randomisation was 1:1, in balanced variable blocks of eight. Randomisation was stratified by site to minimise the possibility of a disparity in the number of women allocated to either group at either of the two study sites (Figure 1, pg. 44). Participants were allocated to either caseload midwifery care (intervention) or standard maternity care (control). It was not possible to mask assignment to either women or health professionals.

Recruitment

The MGP caseload model had been in place in the study setting for four years prior to the trial commencing. Conducting the first booking visit in the woman's home was a well-established feature of the model. As recruitment and randomisation to the RCT therefore needed to occur prior to the first booking visit, I based myself in the antenatal clinic in order to access booking referrals as they were received. I then telephoned eligible women, informed them of their acceptance to the hospital, and described the models of care available. Women were then invited to receive information regarding the trial (Appendix 2) with a view to participation. Interested women were posted a brochure on the various models of care on offer at the hospital as well as a M@NGO trial brochure.

Five days later I made a follow-up phone call to confirm the women had received the brochure, to assess their understanding of the study and to answer any questions. It was at this time that I obtained women's verbal consent to participate in the study. I then randomised the woman to either caseload or standard maternity care via the central telephone randomisation service. Women were advised immediately of the allocation outcome which was entered into the Trial Register and Daily Log Book. The consent form was placed within a designated area of the woman's medical record ready for completion by the midwife at the first antenatal visit. In caseload care, women confirmed their participation in the trial by giving written consent (Appendix 3) at the first booking visit (in their home). Women allocated to standard maternity care gave written consent at the first booking visit in the hospital or community-based antenatal clinic. Woman who declined to give written consent, or who were ineligible to participate, were referred back to standard maternity care or placed on the MGP waiting list, should a place (outside of the trial) became available.

Ethical considerations

Ethical requirements pertaining to research in Australian health settings were used to guide this study (NHMRC, 2007). In gaining consent, the rights of participants were maintained by following best practice and NHMRC general requirements which ensured participation was a voluntary choice, based on sufficient information, understanding of the proposed research and the implications of being involved. Approvals from the hospital Human Research Ethics Committee (HREC) (Ref No 1526M) and Australian Catholic University HREC (Q2011 51) were obtained prior to the trial commencing in June 2010 (Appendix 8). Annual progress reports to both of the above-mentioned HREC committees were completed as required.

Following randomisation each participant was given a unique study ID number. Participant identity and matching ID numbers were known only to the M@NGO trial researchers. All electronic data were stored in a password protected computer file, and hard copy files were stored in a locked filing cabinet in a secure area accessible only to the M@NGO trial researchers. Study information will be disposed of securely in accordance with the hospital (Mater Health Services, 2014) and University (Australian Catholic University, 2014) retention and disposal schedules. As a student researcher and hospital midwife I was aware that being known to colleagues, and easily identified as a midwife by women, created the potential for bias in regard to trial processes. Actions I used to avoid potential bias included wearing civilian clothing on my allocated research days, introducing myself to women and staff as a student researcher and wearing photo identification titled 'student researcher'. I adhered strictly to trial processes and used email to help formalise communication with women and local teams. I felt that by adopting these strategies I was viewed more as a student researcher by women and among my midwifery colleagues.

Data collection

Baseline demographic data were collected by the midwife at the first booking visit and entered into the hospital's obstetric database 'MATRIX' (see glossary). To obtain the remainder of data required for this Case Study I conducted a detailed chart review of all participants following their discharge from maternity care. Data were captured on a paper data collection tool developed specifically for the Case Study (Appendix 4). Each data collection tool contained the same study number allocated to individual participants.

The chart review examined all relevant sections of the woman's health record including the antenatal hand held record, risk assessment tool at booking, intrapartum care entries in the progress notes, the partogram (labour progress chart) and electronic birth summary generated from the MATRIX database. Key data items collected included; women's allocated model of care at booking and labour onset, name of the primary midwife and her MGP (at booking), risk status according to the national 'Midwifery Guidelines for Referral and Consultation' (see glossary) at booking and at labour onset, number of antenatal visits attended and with whom (core midwife, primary or back-up MGP midwife, GP or obstetrician), professional role of person who admitted the woman in labour, number and role of intrapartum health professionals, the amount of time each professional spent with women (in 15-minute increments), and the number of intrapartum vaginal examinations undertaken for the assessment of labour progress. As the role of the health professional who conducted vaginal examinations was recorded very infrequently, this was not obtained. This is a possible issue with documentation (or compliance) at the study setting, beyond the scope of the thesis.

Where necessary for incomplete antenatal handwritten record entries, the hospital databases (MATRIX) and Virtual Electronic Record Data Integrator (VERDI) were accessed. The MGP client allocation spreadsheets were also examined to confirm the allocation of women to a particular group practice and the midwives working in that group at the time of the study. A woman's medical record provided the best record of intrapartum contact, which was defined as those health professionals who were documented as providing intrapartum care including midwives, obstetricians (consultants, registrars, fellows and resident medical offers) medical and midwifery students.

All time periods were categorised in 15-minute increments. Minutes were either rounded up or down to the nearest minute interval. Any times below 15 minutes were rounded up to that first category. The length of time each health professional spent with women was determined by an examination of entries made in the woman's labour progress notes. The dates and times of activities that were undertaken as part of a woman's labour care were used to estimate the total time that health professionals were present and delivering care to the woman. Although it is acknowledged that there are potential limitations to this method these limitations would be expected to be the same across groups. After each chart was reviewed the information was transferred from the paper data collection tool into an

electronic folder in the obstetric database (MATRIX) created specifically for this Case Study.

Data analysis

Knowledge of the study setting as a tertiary hospital and the inclusion of all risk women in the study guided methods of analysis for specific outcome measures. For the primary outcome, the number of health professionals who cared for women in the intrapartum period, was dichotomised to either four or less, or more than four, health professionals. This number was based on the assumption that in the intrapartum period women could have contact with two midwives (always have two midwives present at a birth), one doctor (due to the all-risk nature of this model) and possibly one student (medical or midwifery). Similarly, the number of midwives who provided intrapartum care to women were dichotomised as either one or two, or more than two, midwives.

Analysis of data was primarily undertaken using an intention to treat approach. This strategy is commonly used in RCTs to analyse participants in the group to which they were randomly assigned, regardless of the treatment received (Montori & Guyatt, 2001). It is a preferred method of analysis within RCTs to obtain an unbiased assessment of the effectiveness of the intervention (Oleckno, 2008) .

Although the intention to treat approach is preferred in RCTs, outcomes do not necessarily reflect treatment received particularly when there is a crossover of participants. For this reason *per protocol* analysis of participants is sometimes conducted. Per protocol analysis is defined as a sub-set of the main study population whereby those participants who did not adhere to, or receive, the intended treatment are analysed in the group in which treatment was received. This differs from intention to treat analysis and may be more likely to reflect treatment differences (Gupta, 2011). In Case Study one a small number of women (7%; 26/364) crossed over to receive care to in the other model to which they were originally assigned. Hence a secondary analysis of women in their treatment-received group was undertaken.

Statistical analysis was undertaken using SPSS (version 15.0 for Windows). Bivariate analysis (chi-squared tests for categorical data and Mann-Whitney tests due to non-normality in continuous variables) were used to compare demographic characteristics and

outcomes between the two study groups. Probability values of less than 0.05 were considered statistically significant.

Recruitment (at Site 2) was aiming for a total of 912 women: 456 in each arm, to contribute to the overall trial total. However, an interim analysis detected that due to lower than expected attrition rates in the main trial it was to be stopped early at both sites. By this time Site 2 had contributed 420 participants to the main trial total which is the number of women included in Case Study One. As study outcomes relied on intrapartum measures, participants with missing labour and birth data were excluded. This included participants who had undergone elective caesarean section and emergency caesarean section where there was no prior labour.

Case Study Two

Aim

The aim of Case Study Two was to explore how caseload midwives and women in the MGP model of care communicated with each other across the antenatal and postnatal period.

Objective

The objectives were to measure the mode and frequency of communication (i.e. face-to- face visits, phone calls, texts and emails) between caseload midwives and women, across the antenatal and postnatal period.

Design

Case Study Two was a descriptive study which used a cross-sectional observational design. Observational designs are non-experimental and include descriptive studies that summarise the status of phenomena, and correlational studies that examine relationships between variables (Polit & Beck, 2010). Observational studies are used where there is little information about the topic and experimental designs are not feasible (Schneider, Whitehead, LoBiondo-Wood, & Haber, 2013). The descriptive observational design was a pragmatic choice given the limited time available to conduct this study. The cross-sectional approach was selected for its ability to provide a 'snapshot' of the characteristics being investigated at a specific point in time (Newell & Burnard, 2011). This was an important consideration given potential interruption to the work of MGP midwives who were asked to collect data 24 hours a day (when on-duty) for the purposes of the study. Limitations of

descriptive studies include their inability to demonstrate causation, whilst cross-sectional designs are unable to detect a change over time (Schneider et al., 2013).

In order to meet the research objective, a decision was made to measure the frequency and type of contact from the midwives perspective. Conducting a retrospective measurement of contact between MGP midwives and women was considered initially. In a retrospective study, all aspects of the study must be obtained from pre-existing information recorded for reasons other than for the purpose of the study (Hess, 2004). An examination of the hospital databases which contained details about phone contact and face-to-face visits between women and caseload midwives found that these contacts were infrequently recorded, did not include text or email contact, and had limited detail regarding the women who initiated contact. These databases were therefore considered an unreliable data source and the retrospective approach was abandoned and a prospective design (a study design that goes forward in time to measure presumed effects) was chosen. The benefit of using a prospective design allowed data to be collected and verified in real time (Gray, 1998).

Participants and sample

Participants included caseload midwives (n=20) working in the MGPs in the same study site described in Case Study One. A purposive sample of MGP midwives comprising at least one midwife from each of the five MGPs was sought in order to capture data which might reflect the varied populations of women served by each group. Total participant numbers were unrestricted.

Recruitment

The MGP midwives were provided with information about the study via routine weekly in-service education sessions in the month prior to the study commencing (April, 2011); two, one-hour education sessions were provided. The aim of these education sessions was to ensure all MGP midwives were aware of the study and had an opportunity to be involved. Information presented during the education sessions included the background to the study and implications for practice; time was made available for questions. Each midwife was also given a participant information sheet to read which explained the planned research, aims and objectives and risks involved (Appendix 5).

Ethical considerations

All MGP midwives who wished to participate provided written consent (Appendix 6). At the time of obtaining consent, midwives were also invited to participate in 1:1 interviews which aimed to explore their understanding of the continuity of midwifery care that they provided. However, it became apparent that the research questions to be explored in the interviews were quite different to the questions regarding midwife-client contact. It was therefore decided that the interview data would be not included in this thesis but analysed and published separately. At the time of recruitment, each participant was given a unique study ID number which correlated to the number entered on their data collection tool. Participant identity and matching ID numbers were known only to me as the student researcher. All data were de-identified before analysis commenced. All electronic data pertaining to the study were stored in a password protected computer file accessible only to me. All computer files were backed-up each 24 hour period as per the study protocol. Hard copy files were stored in a locked filing cabinet in a secure area. All information pertaining to Case Study Two will be disposed of securely in accordance with the hospital (Mater Health Services, 2014) and University (Australian Catholic University, 2014) retention and disposal schedules.

Ethical considerations included the potential for bias arising from my role as both a student researcher and a clinical midwife currently employed at the study site. Being a colleague of many of the MGP midwives was useful for obtaining 'buy-in' to support the research. It also required me to take steps to reduce the threat of coercion. These steps included informing midwives that there was no obligation to participate, that participation was voluntary, and there would be no repercussion from non-participation. The midwives were invited to inform me confidentially (via email) of their interest in participating in the study and their inclusion was not made known to any of the other MGP midwives.

With regard to possible impact on participants, it was anticipated that collecting data for the purpose of the Case Study would not extend beyond the inconvenience caused by having to record all contact with women 24 hours a day for duration of their data collection period (two weeks). Feedback from the midwives prior to the study commencing indicated that disruption to their practice would be minimal. The midwives also demonstrated their support for the study by their involvement in the design of the data collection tool, which two midwives agreed to pilot for two days prior to the study taking place. The study was granted approval from the hospital HREC (Ref No 1718QA) and Australian Catholic University

HREC (Register No Q2011_39) (Appendix 8). Annual progress reports to both of the above-mentioned HREC committees were completed as required.

Data collection

A purpose-designed data collection tool was created for use in this study (Appendix 7). The tool was designed to gather information on the number and type of contacts which occurred between MGP midwives and women. The tool captured information over 24-hour periods, for ten consecutive days, within a two-week timeframe. This timeframe was suggested by the MGP midwives in order to accommodate peaks and troughs in caseload care activity. At recruitment the midwives were given instruction on how to complete the data collection tool.

The data collection tool sought the following information: mode of contact (face-to-face visits, phone calls, texts, emails); time of day; length of contact (minutes); on or off-duty (including on-call) if contact was with the primary or backup midwife; and whether contact was planned or unplanned. Planned contact was regarded as midwife-initiated whereas unplanned contact was initiated by the woman. Client demographic data included parity (nulliparous or multiparous), age (21 years and under), gestation (in weeks) or postnatal (days). The tool contained a legend of category definitions to assist the midwives with accuracy in recording data.

Data analysis

The analysis process involved manually entering information from all of the midwives individual data collection tools (n=162) into an Excel (Microsoft, 2010 v14.0) spread sheet containing predefined fields. During data entry of text communications (in minutes), it was noted that texts of less than five minutes were often omitted, because the midwives indicated these reflected very brief texts. A decision was therefore made to assign two minutes per text to these missing data in preference to omitting them altogether. The data collection tool was not designed to include midwife's time when attending women in labour; however some MGP midwives recorded contact in labour as a face-to-face visit. For this reason, any face-to-face visits exceeding two hours were deemed likely to be care of women in labour and were excluded. Not all data collection tool fields (e.g. parity or on-call status) were completed on each occasion by the midwives. However, as missing data was low overall (7% or less) and was unlikely to have a significant impact on results, all missing data were

excluded prior to analysis. Although email contact was included in the data collection tool, as there was only one email contact recorded, it was excluded from analysis.

A Statistical Packages for the Social Sciences (SPSS version 15.0) file was created to accommodate the data and required variables and data from the Excel spread sheet were directly imported. Data cleaning and error checking was undertaken using scatter plots to identify outliers and descriptive statistics were used to identify missing data. Missing data points were compared with original records and adjusted as required. Normality testing of data then followed. Testing the normality (distribution) of data is a prerequisite for statistical tests because the outcome will determine what tests are applicable. For example, where data are normally distributed (following a bell curve), parametric tests are indicated. As data were not normally distributed, non-parametric tests including Chi-square and Mann-Whitney were used. Simple descriptive statistical analyses of data were undertaken to determine frequencies. Bivariate analyses of categorical variables (comparing the different modes on contact used by women and midwives) were tested with probability value of 0.05 or less considered significant (Pallant, 2010).

Summary

This chapter provided details of the Case Study methodology chosen to explore the topic of midwifery continuity of care. It also explained in detail how specific research questions were addressed through two Case Studies, which each had a different design.

The chapter described the methods used in Case Study One to compare intrapartum continuity of care for all risk women in a caseload midwifery model with women in standard care through a sub-study of a RCT. This contrasted with Case Study Two which described how modes of communication between midwives and women were explored during the antenatal and postnatal periods using a descriptive cross-sectional design.

The next chapter will provide results for each of the two Case Studies.

Chapter Four: Results

Case Study One

Intrapartum contact between women and health professionals

Case Study One involved participants at Site 2 of the M@NGO trial (N=420) who were randomised to either intervention (caseload N =209) or control (standard care N=211) groups. A number of women were excluded (n=56) from analysis in the caseload group (n=23) and standard care group (n=33) leaving the total number of analysed participants (n=364) in the caseload group (N=186) versus standard care (N=178) (Figure 3).
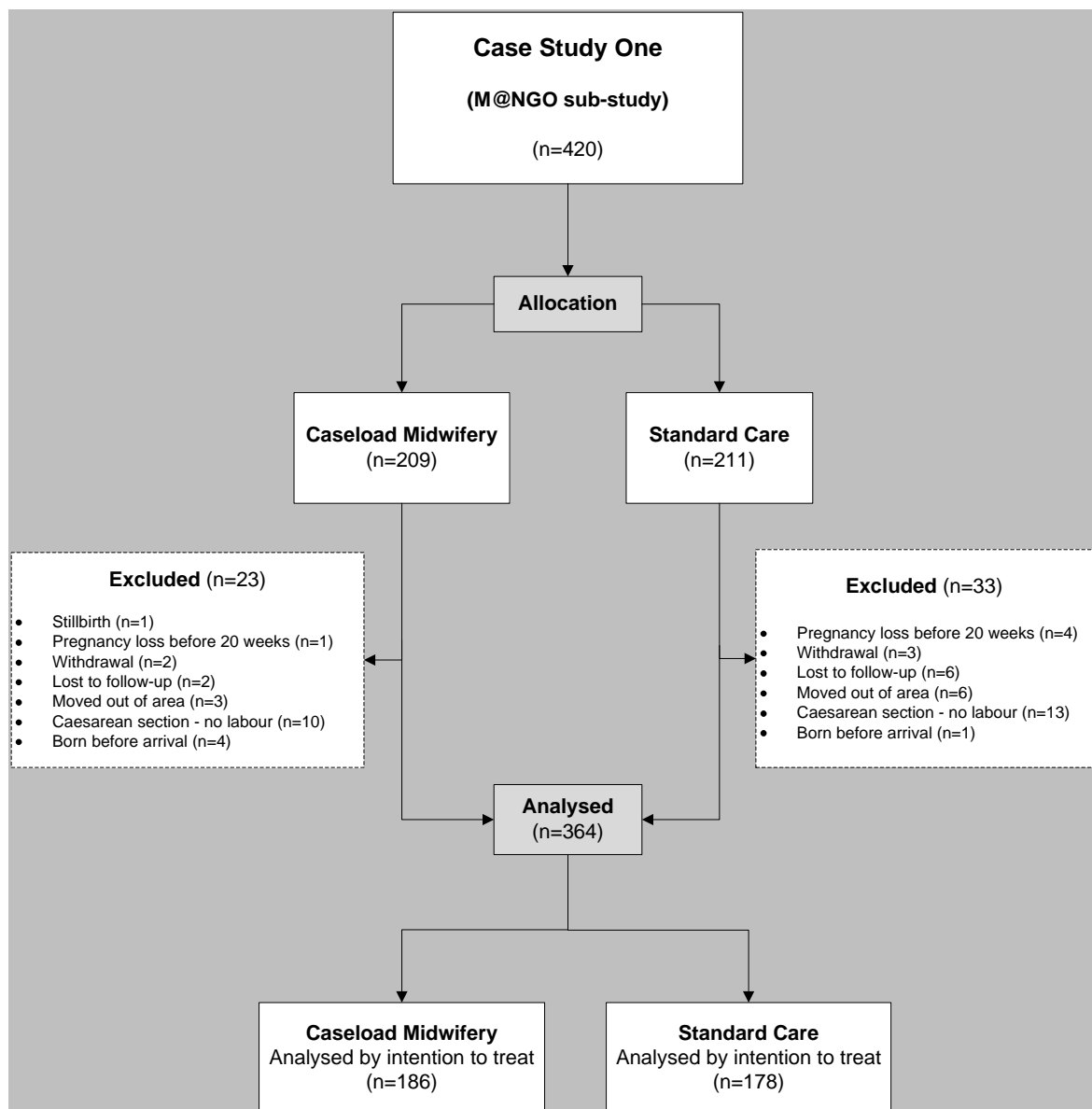
Figure 3:   Participant flow

Baseline characteristics

A comparison of baseline characteristics between women in caseload (intervention) and standard care (control) found no significant difference between the two groups (Table 1).

Table 1:   Baseline Characteristics of women

	Caseload group N=186	Standard Care group N=178	
	n (%)	*n (%)*	*p value*
Maternal age (years)			0.45
< 20	2 (1%)	8 (5%)	
20-24	30 (16%)	31 (17%)	
25-29	67 (36%)	57 (32%)	
30-34	61 (33%)	54 (30%)	
35-39	22 (12%)	24 (14%)	
≥ 40	4 (2%)	4 (2%)	
Parity			0.41
Nulliparous	125 (67%)	105 (59%)	
1	41 (22%)	48 (27%)	
2	13 (7%)	20 (11%)	
3	6 (3%)	4 (2%)	
≥ 4	1 (1%)	1 (1%)	
Identified risk at labour onset ^			
None identified	73 (39%)	66 (37%)	0.38
Medical or obstetric risk factors	94 (50%)	88 (49%)	**
Social risk factors	36 (19%)	47 (26%)	0.07
BMI ±			0.93
Underweight (<18.6)	10 (5%)	11 (6%)	
Optimum (18.6-24.9)	118 (64%)	109 (61%)	
Overweight (25-30)	36 (20%)	39 (22%)	
Obese (>30)	20 (11%)	19 (11%)	
Missing *	2	0	
SEIFA index ≠	9 (8-9)	9 (8-9)	**

^ Medical or obstetric and Social risk factor groups are not exclusive
± BMI= Body-Mass-Index
≠ SEIFA = Socio-Economic Indexes for Areas
* Denotes p value excluding missing data
** Denotes no p value calculated as all values constant

Primary Outcome

There was a statistically significant difference between groups for the primary outcome of number of health professionals who attended women in the intrapartum period (p= 0.01) (Table 2). As this Case Study used an opportunistic sample size it was not powered for the primary outcome. However a *post hoc* power analysis demonstrated that, assuming a type I error of 0.05, the power of the test was 82% (Table 2).

Table 2:   Women's intrapartum contact with health professionals

	Caseload group N=186	Standard Care group N=178	
Intrapartum care providers	*n (%)*	*n (%)*	*p value*
Midwives			0.01
1	47 (25%)	22 (12%)	
2	81 (44%)	65 (37%)	
3	37 (20%)	62 (35%)	
4	13 (7%)	20 (11%)	
5	7 (4%)	6 (3%)	
6	0	2 (1%)	
7	1 (0.5%)	0	
8	0	1 (0.6%)	
Total Midwives > 2	58 (31%)	91 (51%)	< 0.001
Obstetricians			0.99
None	83 (44%)	78 (43%)	
1	72 (39%)	71 (40%)	
2	22 (12%)	19 (11%)	
3	6 (3%)	6 (3%)	
4	3 (2%)	4 (2%)	
Midwifery students	36 (19%)	37 (21%)	0.42
Medical students	4 (2%)	17 (10%)	< 0.001
All health professionals (above)			0.07
1	14 (7%)	7 (4%)	
2	54 (29%)	32 (18%)	
3	57 (31%)	53 (30%)	
4	31 (17%)	39 (22%)	
5	11 (6%)	20 (11%)	
6	11 (6%)	19 (11%)	
7	5 (3%)	3 (2%)	
8	2 (1%)	2 (1%)	
9	0	2 (1%)	
10	0	0	
11	1 (0.5%)	1 (0.6%)	
Total Health Professionals > 4	30 (16%)	47 (26%)	0.02

Of the women receiving caseload care a significantly fewer number saw more than two midwives throughout the intrapartum period (31%; 58/186) compared with women in standard care (51%; 91/178; p< 0.001) (Table 2).

The number of obstetricians who attended women during labour was evenly distributed across both groups with women in the caseload group (55%; 103/186) and standard care (56%: 100/178) seeing at least one obstetrician during the intrapartum period (p=0.73) (Table 2).

Small numbers of midwifery (19%; 36/186 versus 21%; 37/178) and medical students were recorded as caring for women in both groups, however women in the caseload group had significantly less contact with medical students (2%; 4/186) compared with women in standard care (10%: 17/178) (p<0.001) (Table 2). The median length of time all women were in labour (6.8 hours in caseload versus 6.4 hours in standard care), this did not differ significantly between groups (p= 0.20) (Table 4).

Secondary Outcomes

Intrapartum presence of a known midwife in the caseload group

The intrapartum presence of a primary or backup midwife (who was known to the woman antenatally) was measured for women in the caseload group. A total of 96% (178/186) of women had contact with either their primary midwife or backup midwife in labour (Table 3). Women received intrapartum care from their primary midwife (38%; 71/186), backup midwife (36%; 67/186), or both primary and backup midwife (22%; 40/186). Women who did not receive intrapartum care from either their primary or backup midwife (4%; 8/186) had either crossed over to standard care (3%; 6/186) or had received care from a core (hospital-based) midwife (1%; 2/186).

The total number of women who received care from their primary midwife in the intrapartum period was 60% (111/186). However, due to the nature of data collection I can confidently say that 96% of women had met the midwife (primary or backup) who attended to them during the intrapartum period.

During the study a number of women (7%; 26/364) crossed over to the opposite model of care to which they were randomised (Table 3). As more women crossed over from standard care to the caseload model (5%; 20/364) compared to those who crossed from caseload to

standard care (2%; 6/364) the overall number of women who received intrapartum caseload care (n=200) in the treatment received group, was higher than standard care (n=164). The *per protocol* analysis conducted found that the proportion of women who were attended to by their primary midwife was 66% (131/200) and a high number of women received care from either a primary or backup midwife (99%; 198/200). Women in the treatment received group who did not receive intrapartum care from a primary or backup midwife (1%; 2/200) were in the birthing area for a very brief period before the primary midwife had time to arrive and were cared for by a core (hospital) midwife.

Table 3:   Intrapartum presence of primary and backup midwives in intention to treat and treatment received groups

	Caseload group Intention to treat N = 186	Caseload group Treatment received N = 200
	n (%)	*n (%)*
No MGP Midwife	8 (4%)	2 (1%)
MGP Midwife	**178 (96%)**	**198 (99%)**
Primary midwife only	71 (38%)	70 (35%)
Backup midwife only	67 (36%)	67 (33%)
Primary and backup midwife	40 (22%)	61 (31%)

Time health professionals spent attending women in the intrapartum period

The time health professionals spent attending women in the intrapartum period was measured in fifteen minute increments which were then collated to total time in hours to allow for a clearer comparison of data. The median amounts of time were similar in both groups and were not statistically significant (Table 4).

As some core (hospital-based) midwives (54%; 100/186) spent time with women in the caseload group in the intrapartum period, this outcome was measured. However, as no caseload midwives were recorded as spending time attending women in standard care, no comparison could be made.

Table 4: Time health professionals spent attending women in the intrapartum period

	Caseload group N=186	Standard Care group N=178	
	Median (IQR) n	*Median (IQR) n*	*p value*
Health professionals	**Hours**	**Hours**	
MGP Midwives	6 (3-10) (n= 177)	NA	
Primary midwife	5 (2-8) (n= 131)	NA	
Backup midwife	4 (2-8) (n=128)	NA	
Core Midwives	0.5 (0.3 -1) (n= 100)	6 (3-10) (n=170)	< 0.001
Any Midwife	7 (3-11) (186)	6 (3-10) (178)	0.40
Obstetricians	0.5 (0.3 -1) (n=103)	0.5 (0.5 - 0.75) (n=100)	0.74
Medical Students	0.5 ** (n= 4)	0.5 (0.5-0.75) (n=17)	0.52
Midwifery Students	4 (0.8 - 6) (n= 36)	2 (0.5 - 6) (n=37)	0.20
All health professionals (above)	7 (4-13) (n= 186)	7 (4 -11) (n=178)	0.43
Women's total time in labour	**6.8 (3,7-10.7) 186**	**6.4 (3.5-9.5) 178**	**0.20**
** Denotes no IQR calculated as all values constant			

Number of vaginal examinations

The number of vaginal examinations that were conducted was compared between women receiving caseload and standard care. There was no significant difference in the number of vaginal examinations recorded across groups, for which the median number was three (p=0.56) (Table 5).

Table 5: Number of intrapartum vaginal examinations conducted

	Caseload group N=186	Standard Care group N=178	
Vaginal examinations	*Median (IQR) (n)*	*Median (IQR) (n)*	*p value*
Total performed	3 (1-4) (n=522)	3 (1-4) (n=453)	0.56

When the number of vaginal examinations was compared between the women with and without obstetric risk factors at onset of labour, those women with risk factors had a significantly higher chance of having three or more intrapartum vaginal examinations (56%; 126/225 versus 44%; 61/139; p =0.02).

Summary

Findings from Case Study One revealed that women in caseload midwifery care saw significantly fewer health professionals in the intrapartum period. Women's intrapartum contact with more than two midwives was significantly higher in the standard care group although similar numbers of obstetricians, medical and midwifery students were recorded as having attended women in both groups. Women in the caseload group received intrapartum care from a high proportion of primary or backup midwives from the same MGP in which they were originally enrolled. The time health professionals spent attending women in the intrapartum period, and the numbers of vaginal examinations undertaken for labour assessment, were similar in both caseload and standard care groups.

Case Study Two

Modes of communication between caseload midwives and women

A total of 162 days of data were collected by the MGP midwives. Each MGP midwife collected an average of 11 days of data over approximately 14 days. The data collection period ran from 27 May to 12 August 2012; however the majority of data (141/162 days) were collected over approximately five weeks (27 May to 8 July 2012).

MGP midwife demographics

Of the MGP midwives employed at the study site (N=20), the majority (75%; 15/20) participated in Case Study Two. Over half of the MGP midwives were educated in the UK (53%; 8/15) and the majority (73%; 11/15) were university graduates (Table 6). None of the participants had previously worked in a MGP model at another Australian hospital.

Table 6:   MGP midwife demographics

	MGP midwives N=15
	n (%)
MGP location	
1	3(20%)
2	3(20%)
3	4(27%)
4	2(13%)
5	3(20%)
Country midwifery education completed	
Australia	7(47%)
UK	8(53%)
Midwifery education	
Hospital	4(27%)
University	11(73%)

Frequencies of contact

All MGP locations at the study site (n=5) were represented and a total of 1,442 contacts between the women and midwives were collected (Table 7). An average of 96 contacts per midwife occurred. Across the maternity care episode the majority of contact occurred between the hours of 0700-1459 (72 %; 1,027/1,410) between a woman and her primary midwife (77%; 1,085/1,413). The proportion of planned (midwife-initiated) contact (52%; 695/1339) and unplanned (woman-initiated) contact (48%; 644/1,339) was fairly evenly distributed. Most contact occurred when the midwife was on-call (93%; 1,333/1,436) and the majority of contacts were likely to be with primiparous women (68%; 947/1,387) who represented 50% of the midwife's caseload. Over one third of midwife-woman contact overall was via text (37%; 537/1,442) which was marginally higher than phone calls (34%; 484/1,442) or face-to-face visits (29%; 421/1,442). The majority of contact occurred in the antenatal period (59%; 818/1,382) compared to the postnatal period (41%; 564/1,382).

Table 7:   **Contact between women and midwives**

Contact variable	Total contacts N=1442
	n (%)
Time of day contact	**(N=1410)**
07:00-14:59	1027 (72%)
15:00-23:59	335 (24%)
00:00-06:59	48 (4%)
Allocated midwife status	**(N=1413)**
Primary Midwife	1085 (77%)
Backup Midwife	328 (23%)
Planned and unplanned	**(N=1339)**
Planned	695 (52%)
Unplanned	644 (48%)
Midwife's on call status	**(N=1436)**
On call	1333 (93%)
Day off	103 (7%)
Parity	**(N=1387)**
Primiparous	947 (68%)
Multiparous	440 (32%)
Mode of contact	**(N=1442)**
Face to face visit	421 (29%)
Phone call	484 (34%)
Text	537 (37%)
Antenatal and Postnatal	**(N=1382)**
Antenatal	818 (59%)
Postnatal	564 (41%)

Timing of contact

Woman's parity and gestation at the time of contact with the midwife was compared in order to identify any differences between multiparous and primiparous women. The decision to divide pregnancy gestation into several sections was to allow a more detailed view of the timing of contact than would be obtained from observing data in the usual pregnancy trimesters. The majority of contact with primiparous women occurred between 37-40 weeks (33%; 167/513) whereas most contact with multiparous women was between 29-36 weeks (31%; 88/282), (Table 8).

Table 8:   **Gestational age at contact by parity**

	Primiparous N=513	**Multiparous** N=282	
Gestation (in weeks)	*n (%)*	*n (%)*	*p value*
			< 0.001
0-12	30 (6%)	35 (12%)	
13-20	70 (13%)	46 (16%)	
21-28	87 (17%)	37 (13%)	
29-36	126 (25%)	88 (31%)	
37-40	167 (33%)	45 (16%)	
41-42	33 (6%)	31 (11%)	

Measurements were made for contact between primary or backup midwives and women in the antenatal period. The majority of contact between the primary midwife and women occurred between 37-40 weeks (26%; 152/596) whereas contact with the back-up midwife was more likely to occur between 29-36 weeks (38%; 83/219; p <0.001) (Table 9).

Table 9:   **Gestational age at contact with primary and backup midwives**

	Primary midwife N= 596	**Backup midwife** N=219	
Gestation (in weeks)	*n (%)*	*n (%)*	*p value*
			< 0.001
0-12	60 (10%)	10 (4%)	
13-20	103 (17%)	13 (6%)	
21-28	97 (16%)	33 (15%)	
29-36	140 (24%)	83 (38%)	
37-40	152 (26%)	59 (27%)	
41-42	44 (7%)	21 (10%)	

Measurements were also made for contact between primary or backup midwives and women in the antenatal period, compared with the postnatal period. More contacts overall occurred in the antenatal period (810 vs. 552) although a higher proportion of contacts occurred between primary midwives and women in the postnatal period compared with the antenatal period (82% vs. 73%). However, this difference was not significant (p= 0.598).

The most commonly used mode of contact in the antenatal period was via phone call (39%; 323/818), compared with the postnatal period where the majority of contact was via text (41%; 232/564) (Table 10). Results also revealed that contact that occurred during daytime hours (0700-1459) was somewhat less likely in the antenatal period (69%; 557/808) compared with the postnatal period (77%; 435/561; p < 0.001). When compared to

multiparas, the amount of contact midwives had with primiparas was significantly higher in both the antenatal (65%; 513/795) and postnatal period (73%; 399/548; p<0.001).

The highest amount of contact that occurred when the midwife was off-duty took place antenatally (9%; 71/817) compared with postnatally (5%; 29/564). However, the overall percentage was low (7%; 103/1442). The most frequently used mode of contact when the midwife was off-duty was text messages (4%; 66/1442), followed by phone calls (2%; 31/1442) and then face-to-face contact (0.5%; 6/1442).

Table 10:   Antenatal and postnatal contact

	Antenatal	Postnatal	
	n (%)	*n (%)*	*p value*
N= 810		**N= 552**	<0.001
Primary Midwife	593 (73%)	455 (82%)	
Backup Midwife	217 (27%)	97 (18%)	
N=791		**N=548**	<0.001
Primipara	513 (65%)	399 (73%)	
Multipara	282 (35%)	149 (27%)	
N= 808		**N= 561**	<0.001
0700-14:59	557 (69%)	435 (77%)	
15:00-23:59	212 (26%)	117 (21%)	
00:00-06:59	39 (5%)	9 (2%)	
N= 818		**N= 564**	<0.001
Face-to-face contact	220 (27%)	182 (32%)	
Phone	323 (39%)	150 (27%)	
Text	275 (34%)	232 (41%)	
N= 817		**N= 564**	0.12
On call	746 (91%)	535 (95%)	
Day off	71 (9%)	29 (5%)	

The contact between MGP midwives and women was measured over the time of day, and then compared across a woman's pregnancy gestation (in weeks) then into the postnatal period (up to 6 weeks post birth). Findings revealed that overnight (0000-0659) contact increased with gestation, with the highest amount (56%) occurring between 37-40 weeks (p <0 .001). Whereas the highest amount of daytime (0700-1459) contact (29%) occurred between 29-36 weeks and the highest afternoon and evening (1500-2359) contact (29%) occurred when women were at term (37-40 weeks) (Figure 4).
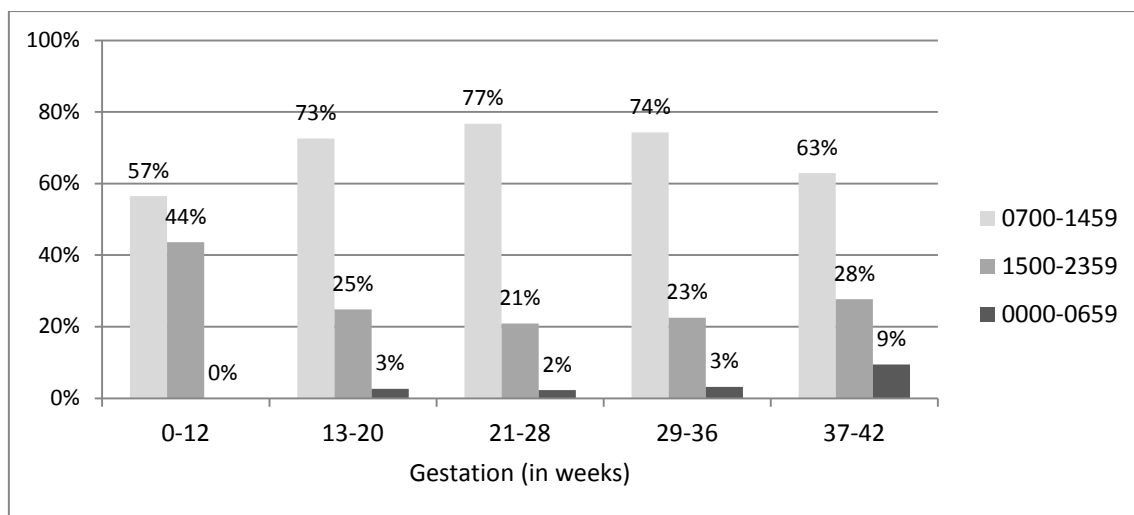
Figure 4: Time of day contact by gestation

Planned and unplanned contact

Contact which was planned versus unplanned was also compared across the mode of contact used (face-to-face visits, phone calls or texts). The amount of planned (52%; 695/1339) and unplanned (48%; 644/1339) contact overall was fairly evenly distributed. However, when measured against mode of contact, significant differences were found, which included that face-to-face visits were mostly planned (95%; 397/420) whereas phone calls (66%; 307/463) and texts (69%; 314/456) were mostly unplanned ($p < 0.001$) (Figure 5).
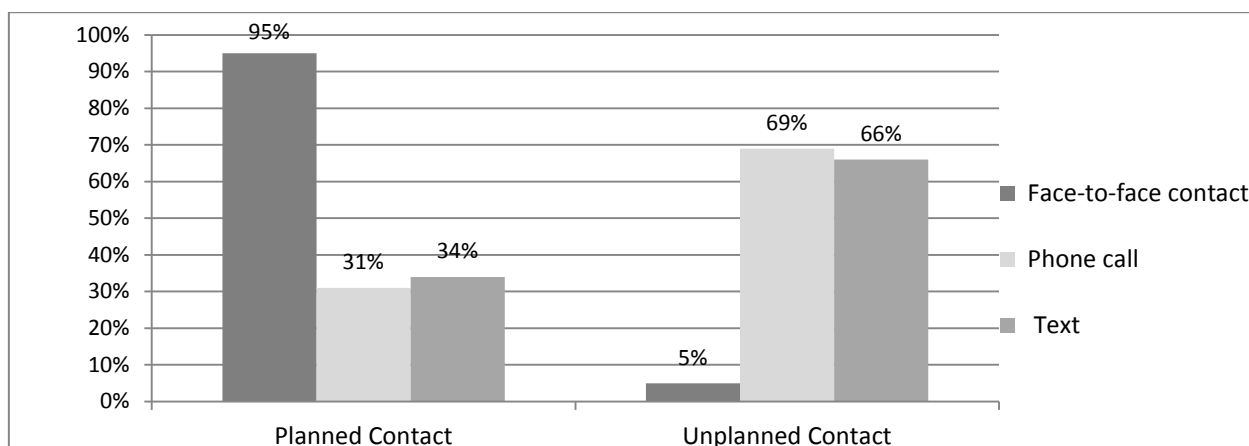
Figure 5: Mode of planned and unplanned contact

Planned and unplanned contact was also compared across the time of day that contact occurred. Results found that daytime contact (0700-1459) was mostly planned (58%; 547/950) compared with afternoon and evening (1500-2359) contact (58%; 183/315) and

overnight (0000-0659) contact (87%; 41/47), which was mostly unplanned (p <0.001), (Figure 6).
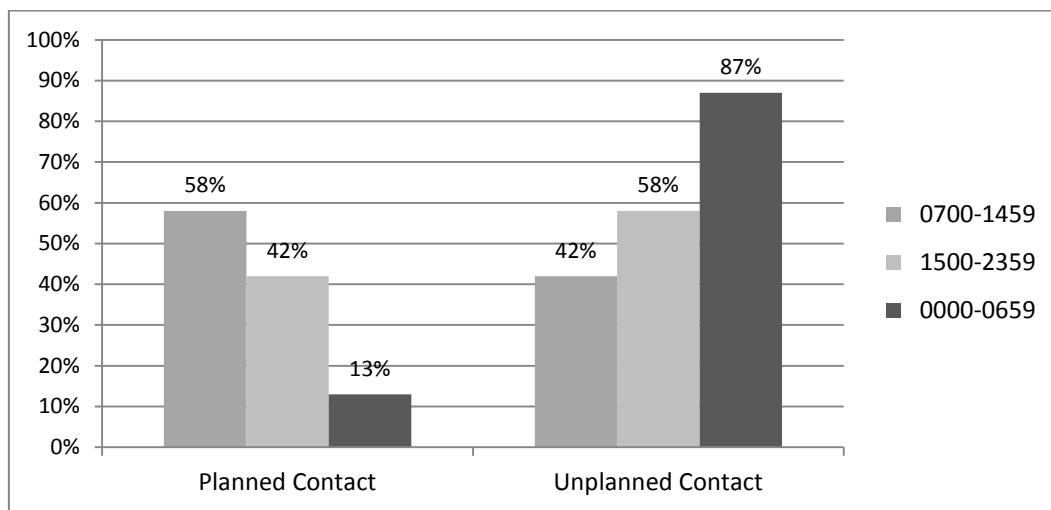
Figure 6:   Planned and unplanned contact over a 24/hour period

Planned and unplanned contact in the antenatal period was compared with the postnatal period. Results found that antenatal contact was most likely to be unplanned (54%; 420/771) than planned (44%; 351/771) whereas postnatal contact was more likely to be planned (63%; 320/512) than unplanned (37%; 192/512; $p < 0.001$).

Planned and unplanned contact was also compared across a woman's gestation (in weeks). Results found that planned and unplanned contact changed over the antenatal period: at 0-12 weeks gestation the majority of client contact was planned (61%; 36/59) whereas by term (37-40 weeks) the majority of contact was unplanned (58%; 121/209; p < 0.001), (Figure 7).
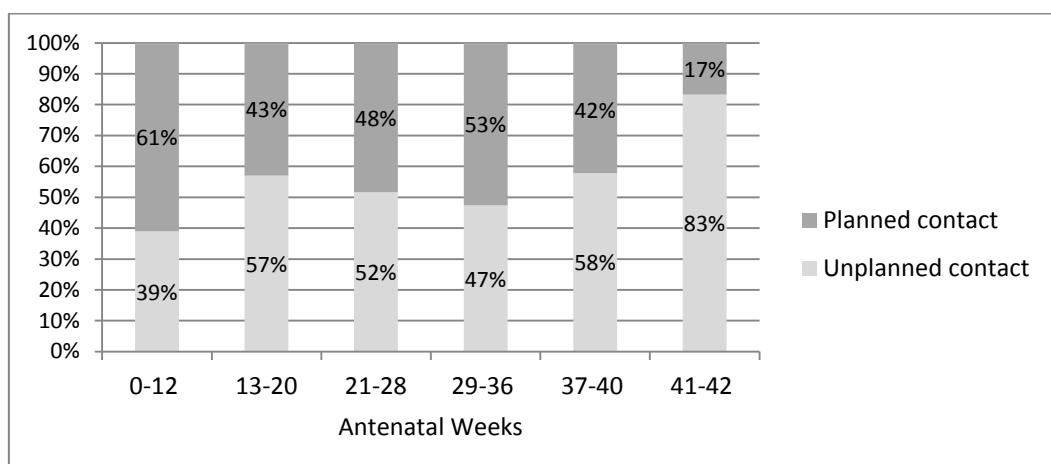
Figure 7:   Planned and unplanned antenatal contact

The highest proportion of contact between midwives and women in the postnatal period (41%; 231/560) occurred within the first 6 days. Contact between midwives and women subsequently tapered off, however a similar number of women remained in contact with their midwives from 14 to 20 days (11%; 62/560), 21-28 days (13%; 74/560) and from 29 days to six weeks (12%; 68/560) (Figure 8).
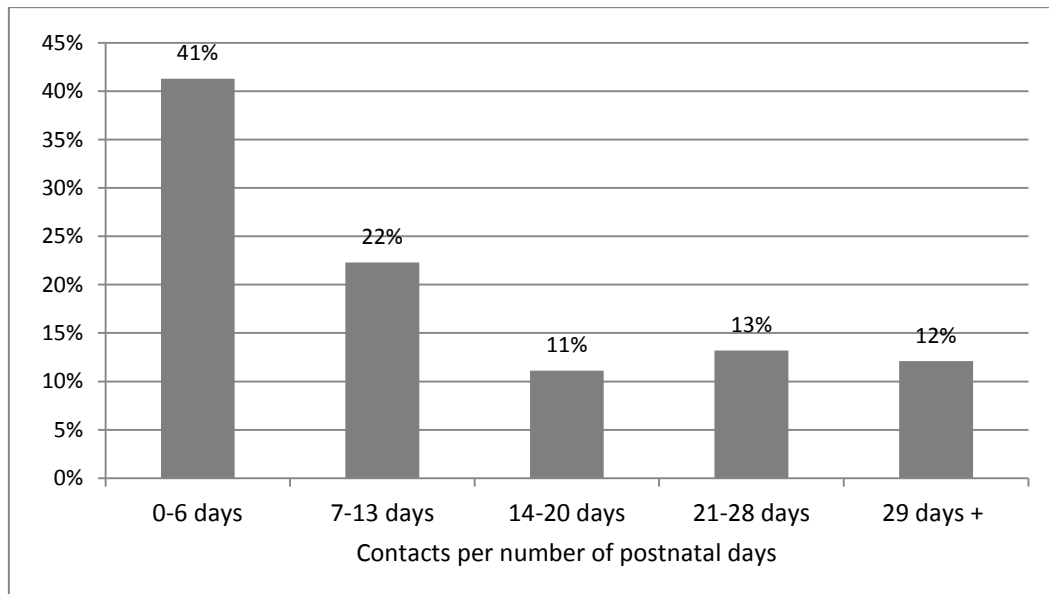
Figure 8:   Midwife-woman contacts within the postnatal period

Summary

The results of Case Study Two, which focused on the mode and timing of contact between midwives and women across the antenatal and postnatal period produced several significant findings. These included that the majority of contact that occurred between primary midwives and women and how this took place within daytime hours and when the midwife was on-call. Unexpected findings included the amount of text message and contact that occurred when the midwife was off-duty. In this study, 'on-call' status, planned and unplanned contact, time-of-day, pregnancy gestation and number of days postnatal, were all found to influence the mode of contact, however a woman's age and parity did not.

Chapter Summary

Results from both Case Studies were presented separately in this chapter. A key result from both Case Studies was the high degree of contact between women and their primary caseload midwife throughout the pregnancy continuum.

The discussion in the next chapter will interpret the results from both Case Studies. It will demonstrate the relevance of findings to the research questions, aims and objectives, and the degree to which the identified gaps in the literature have been addressed. The discussion includes sections describing the study strengths and limitations, implications for practice, and future research. A conclusion to the study is then provided.

Chapter Five: Discussion and Conclusion

Introduction

The previous chapter presented the results for each of the two Case Studies conducted for this research. This chapter will discuss both Case Studies in regard to their relevant findings. The discussion for each Case Study will also include strengths and limitations, implications for practice and future research. As this is the final chapter of the thesis, a discussion about the how key research problem areas were addressed is provided, followed by a conclusion to the thesis.

Case Study One

This Case Study compared the delivery of intrapartum care in an Australian tertiary maternity setting between a caseload midwifery model and standard maternity care, which has not been previously reported in studies of caseload care.

The measure of number of health professionals seen by women in the intrapartum period was chosen as the primary outcome to test the hypothesis that the continuity aspect of caseload care may limit the number of health professionals in attendance for women of all risk status. The finding that women in the caseload group received intrapartum care from significantly fewer health professionals compared with women in standard maternity care supports this hypothesis. It is a reassuring finding given that women's satisfaction with intrapartum care has been associated with fewer intrapartum carers (Fereday et al., 2009) and that limited intrapartum interruption has the potential to enhance physiological birth processes (Fahy & Parratt, 2006).

The measurement of the overall number of midwives attending to the intrapartum care of caseload women identified that 58 women (31%; 58/186) were attended by more than two midwives. The way caseload care is organised within the study setting is the most likely explanation for this outcome. Although caseload midwives are on-call 24 hours a day and can work up to 12 hours at any one time, when a women is in labour, there is no allowance for labour assessment to be undertaken in the woman's home, so the caseload midwife must arrange to meet the woman at the hospital birth suite for assessment. If the woman requires intrapartum care before her caseload midwife arrives, care is provided by a hospital (core) midwife. Additionally, hospital policy at the research site which requires two midwives to

be present at every birth is likely to increase the number of core midwives attending to caseload women in the intrapartum period, some of whom will be unfamiliar to her. The attendance of a second midwife at birth is a safety measure common across Australia.

The presence of a known midwife throughout all stages of maternity care, including labour and birth, is reported as being valuable to women for the consistency of information, advocacy and the support they receive (McCourt & Page, 1996; McCourt et al., 1998). The percentage of women who received intrapartum care from their primary midwife in the intention to treat group (60%; 111/186) has not been previously measured in caseload midwifery care and is a reassuring finding. The percentages of women having a known midwife (i.e. primary midwife or backup midwife from the same MGP) attending them in labour and birth were additionally high for women allocated to the caseload group in both the intention to treat (96%; 178/186) and treatment received (99%; 189/200) groups. The findings support another Australian RCT of caseload midwifery conducted for low risk women, that reported 90% for this outcome (McLachlan et al., 2012). It is especially significant given that providing continuity of intrapartum care can be challenging due to the on-call component for midwives and difficulties in organisation of some aspects of caseload care (Homer et al., 2008).

Despite women in the caseload group receiving intrapartum care from significantly fewer health professionals overall, the proportion of women attended to by an obstetrician (measured by number and time) was similar in both caseload and standard care groups. This finding may be due to the similar number of women in each group with identified risk factors in women in the caseload group (61%; 113/186) compared with in standard care (63%; 112/178).

As placement within the clinical areas is considered a vital part of undergraduate training for medical (Dornan, Boshuizen, King, & Scherpbier, 2007) and midwifery students (McCall, Wray, & McKenna, 2009), both types of students rotate regularly through the birthing areas in the study setting. The low number of students that were documented as attending to women in the intrapartum period was an unexpected finding. We had anticipated that many of the women would have had either a midwifery or medical student in attendance in the intrapartum period. The Australian Nursing and Midwifery Council (ANMC) at the time stipulated that student midwives were to have demonstrated being with women at a minimum number of births (n= 40) and to have completed a minimum number of continuity

of care experiences (n=30) in order to obtain midwifery registration (ANMC, 2009). Continuity of care experiences not only require student midwives to accompany women throughout the pregnancy, intrapartum and postnatal period, they also require students to be on-call for the labour and birth of women they are following through (McKenna & Rolls, 2007; Seibold, 2005). It is not known if the low number of students recorded was related to the quota of midwifery and medical students on placement in the birthing suites at the time of the study, or if poor documentation of their presence in the medical record was responsible for this outcome.

Since the time during which Case Study One was completed, a review of student placements at the study setting has been conducted. The review identified that clinical placements required a high level of manual processing and the limited technology available resulted in poor transparency between the relevant health disciplines and the relevant universities (Mater Education, 2014). The review recommended the creation of an online application to capture and collate all clinical placement data. The Student Placement Online Tool (SPOT) was introduced in study setting in late 2012. After 12 months of use, an analysis of SPOT data demonstrated that previous placement methods used fewer than 20 per cent of the total placement capacity which was in contrast to the perception by hospital managers (Mater Education, 2014). As a result of these findings, the allocation of student midwives at the study setting has since been increased.

The median length of time student midwives spent with women (2.5 hours) in the intrapartum period in both groups was also less than expected, as midwifery students are rostered for a full (eight hour) shift in the study site. The time that student midwives spent with women however, was double in the caseload group compared with women in standard maternity care. This outcome may reflect a preference for the allocation of student midwives to the care of women in the caseload model, or the willingness of caseload midwives to support students in the care of women. The rationale behind the allocation of student midwives however was not explored in this study and would require further investigation.

The low number of medical students recorded as attending women in the intrapartum period was also surprising and poor documentation may also have been a reason. The median intrapartum time of 30 minutes that medical students spent with women was similar in both groups and suggests that they were present only to witness the births and not attend women throughout labour.

The similar number of vaginal examinations conducted for women in caseload care compared with women in standard care was an unexpected outcome. The assumption that women in caseload care would have fewer vaginal examinations to women in standard care was based on literature which suggested that where continuity of carer was provided, vaginal examinations may be more consistent and therefore required less often (Incerti et al., 2011; Royal College of Midwives, 2012). It was also thought that in a continuity of carer model, knowing a woman antenatally, may enable the midwife to measure a woman's behaviour instead of needing to use routine measures such as vaginal examinations to assess labour progress (Cheyne et al., 2006). In caseload care there is also an assumption that midwives practice more autonomously and hold a philosophy of non-intervention (NICE, 2014).

The use of vaginal examinations to assess cervical dilatation is heavily relied upon as a measure of labour progress in the study setting where the practice of routine (four hourly) vaginal examinations is policy (Queensland Health, 2012). The importance placed on cervical dilatation is further demonstrated in the study site, where this information is displayed on centrally placed monitors in all birthing rooms, and on large screens in the central staff station. As all midwives in the study setting are required to adhere to the same hospital guidelines, it was likely that this was a key contributor the similar numbers of intrapartum vaginal examinations were undertaken in each group. The finding suggests that caseload midwives may not be able to act autonomously in this setting (Walsh & Devane, 2012) or perhaps that the practice of caseload midwives in the tertiary setting comes under greater scrutiny (Fahy, 2012), at least on the site where this study was conducted. Midwives have reported that measuring labour progress by vaginal examinations is considered to be of higher importance in tertiary facilities compared with primary care areas (i.e. in the community) where they may feel more autonomous and their decision not to do routine (four-hourly) vaginal examinations does not come under question (Dixon, 2005).

Organisational time pressures which operate in the tertiary setting may also influence the use of vaginal examinations to determine a woman's progress and predicted length of stay in the birthing area (Cheyne et al., 2006). In maternity settings where a medicalised view of pregnancy and birth dominates, clinical policies that govern intrapartum management encourage the use of vaginal examinations for labour assessment (Burvill, 2002). Intrapartum vaginal examinations are also offered to women as a means of reassuring them of their labour progress (Dixon & Foureur, 2010).

The similar number of vaginal examinations conducted in both groups may also be related to the inclusion of all risk women in the study as women with identified risk factors may require more frequent vaginal examinations to monitor labour progress more closely (than low risk women. In this study there were similar numbers of women in caseload (50%; 94/186) and standard care (49%; 88/178) with obstetric/medical risk factors. When the number of vaginal examinations conducted was compared across the presence of risk factors in women with from either group, women with identified risk factors at labour onset had a significantly higher chance of having three or more intrapartum vaginal examinations (56% 126/225 versus 44%; 61/139; p =0.02). A comparison of vaginal examination frequency and associated risk factors between the intervention and control group was not conducted.

The frequency of intrapartum vaginal examinations is most likely due to a combination of factors including the attitude of health professionals (i.e. midwives and medical officers), the institution's policies, the care environment (Cheyne et al., 2006) and the women's risk status.

Strengths and limitations

As this Case Study used an opportunistic sample as a nested sub-study of a RCT, it was not statistically powered for the primary outcome. However a *post hoc* power calculation for the primary outcome found that it had adequate power to answer the research question. Its strength lies in the randomisation of participants to reduce bias and in data collection which involved a detailed chart review of the antenatal and intrapartum progress notes of all participants. The reliance on documented notes in regard to the number and time each health professional spent in attendance, the number of students present and number of intrapartum vaginal examinations may, due to time constraints, have caused staff to document care hurriedly or retrospectively, potentially affecting accuracy or recall (Jefferies, Johnson, & Griffiths, 2010).

Implications for practice

Addressing the inability for caseload midwives to conduct early labour assessments for women in their homes may reduce the need for women to attend hospital at this time and have contact with midwives not previously known to them. This may increase continuity of carer during the pregnancy and intrapartum period. It is also important as evidence suggests that women who present to hospital in early stages of labour (cervical dilation of 0–3 cm)

are more likely to have obstetric intervention than those who present in more advanced labour (Holmes, Oppenheimer, & Wen, 2001).

Closer monitoring of both midwifery and medical students has the potential to ensure that optimum numbers of students are accommodated and improving documentation of their attendance could be strengthened.

The use of intrapartum vaginal examinations explored in this study has highlighted a need to examine their use in midwifery practice within both care models in the study setting. Amending current policy to recommend intrapartum vaginal examinations as required, rather than routinely, along with a review of the labour chart (partogram), may address the frequency of vaginal examinations. Further education of midwives and medical staff about less invasive and more holistic measures of labour progress such as descent of the fetus through abdominal palpation (Davies, 2011), or extent of the purple line (Shepherd et al., 2010) may also be of benefit.

Future research

Further research would be of value in comparing one-to-one to group antenatal care in the caseload model, in order to assess women's perceptions of the impact group visits might have on the time they spend with their primary midwife.

A comparison of outcomes from this Case Study (i.e. the number of health professionals in contact with women in the intrapartum period) with women in other all-risk caseload models would be useful to assess if this setting made a difference to outcomes.

Conclusion

This descriptive study provided some information about how intrapartum care was delivered within a caseload midwifery model for all risk women in an Australian tertiary maternity setting. It demonstrated that in caseload care, women saw significantly fewer health professionals overall, including midwives, an outcome which has the potential for reduced interruption to the birthing woman. The high intrapartum presence of a MGP midwife indicates that continuity of midwifery carer within the caseload model has been achieved in this study, and that it is possible that the group antenatal care approach contributed to this

outcome. The number of core midwives involved in the intrapartum care of caseload women appears to be influenced by the way caseload care is organised in this setting, in particular the inability for caseload midwives to conduct early labour assessment in the home, prior to a woman's admission to hospital.

Having continuity of carer did not influence the length of time midwives spent with women in the intrapartum period in this study. This may be due to the majority of core midwives working the same length shifts (12 hours) as the caseload midwives and that regulated shift breaks (Queensland Department of Health, 2012) apply to all midwives employed in the Case Study setting.

The hypothesis that women in the caseload model who received continuity of carer would have fewer intrapartum vaginal examinations compared to women in standard care was not supported in this study. The similar number of vaginal examinations conducted for women in both intervention and control groups may be due to a combination of influences of midwifery care in the tertiary environment including hospital policies and guidelines which require routine regular (four hourly) vaginal examinations occur for all women in active labour, and the requirement for all midwives employed in the setting to follow this guidance which impacts on the practice autonomy of midwives. The high-profile display of vaginal examination measures on monitors and the use of monitoring tools such as the partogram, which encourage the use of vaginal examinations to assess labour progress, may have a further influence. Additionally, the limited reliance on alternative (non-invasive) labour assessment measures (such as the purple line or abdominal palpation) and maternity professionals skill or confidence in using them, may also be a factor.

Case Study Two

This Case Study examined communication strategies (face-to-face visits, phone calls, texts and emails) used by midwives and women during the antenatal and postnatal period in order to achieve a greater understanding of how continuity of care is delivered in a caseload model in an Australian tertiary maternity setting.

This study found that the majority of overall contact occurred between women and their primary midwife (77%; 1,085/1,413). This finding is reassuring as the aim of the caseload model is for the primary midwife to provide the majority of a woman's care across the

pregnancy, birth and postnatal period which enables the relational aspect of continuity and its perceived benefits to occur.

Across the time period, women's contact with the primary midwife was slightly less for women in the antenatal period (73%; 593/810) compared to women in the postnatal period (82%; 455/552). An examination of the antenatal contact across the gestational weeks, found the highest amount of contact with the primary midwife (26%; 152/596) occurred at term (37- 40 weeks). This outcome is not surprising as the pregnancy is entering its final phase and women (anecdotally) are seeking contact with their midwives for the purposes of reassurance, advice and information about the pending birth. This time is also the most likely time for a woman to go into labour. The gestation when the highest amount of contact with the backup midwife (38%; 83/219) occurred at 29-36 weeks. The reason for this outcome is unknown and would require further investigation.

The majority of contact occurred between women and midwives during on-call periods and within daytime hours (0700-1459) hours (p <0.001). This is the most significant finding of the study as it is in contrast to the commonly held belief that in MGP the contact with women during unsocial hours is high. This outcome has implications for recruitment as midwives may view the on-call component of MGP as a deterrent to working in the model.

The significantly higher contact which occurred between midwives and primiparous women in the antenatal period (65%; 513/791) and postnatal period (73%; 399/548) was expected. However the slightly higher contact with primiparous women in the postnatal period (73%; 399/548) was not anticipated. This finding may be an indication of the importance of continuity of carer for first time mothers in the early postnatal period, where women have reported fears and anxieties around early parenting and the adaptation to motherhood (Forster et al., 2008).

The availability of continuity of midwifery carer in the postnatal period is also associated with women feeling more able to leave hospital earlier (McLachlan et al., 2012). The higher amount of postnatal contact within the 0-6 days (41%; 231/568) and 7-13 days (22%; 125/568) is to be expected. However the ongoing contact between midwives and women in the caseload model of care from 14-20 days (11%; 62/560) and from 21-28 days (13%; 74/560) and 29 days to six weeks (12%; 68/560) emphasises the need for continuity of carer to be provided for the full postnatal period.

Understanding more about contact between midwives and women, which was planned (midwife-initiated) or unplanned (woman-initiated), provided valuable information about who was initiating contact across the pregnancy continuum. The finding that contact during the daytime (0700-1459) was mostly planned compared to afternoon and evening (1500-2359), and overnight (0000-0659) which was mostly unplanned (p <0.001) demonstrates that women were instigating out-of-hours contact. This finding highlights women's use of (and potential need for) 24 hour access to a caseload midwife. The majority of contact in the antenatal period being unplanned and overnight contact increasing with gestation, is further evidence of this. Women have reported that 24 hour contact with caseload midwives as reassuring (Fereday et al., 2009) and it is a realistic expectation that the need for contact may occur at any time of the day.

Understanding when women are making contact with midwives can assist with workforce planning where more antenatal clinic sessions may be scheduled in the morning to allow the caseload midwives to be available for phone contact from women in the afternoon. The finding that the majority of contact in the postnatal period was planned also suggests that it was likely to be due to the midwife arranging follow up appointments to see women post birth.

The use of text messaging by caseload midwives and women mirrors the expansion of mobile technologies, as their capabilities make staying in contact quicker, easier and cheaper (Crystal, 2008). However, where texting practices are integral to clinical care, as is the case with MGPs, issues arise regarding client confidentiality, accountability for the receipt, interpretation and storage of text content, and the ability for documentation. The potential use of texts for clinical consultation requires further investigation, as was recently highlighted in a NZ coronial inquiry into the death of a newborn, where a midwife was criticised for failing to make voice contact with her client (using text message instead) to make a clinical assessment (Story, 2012).

Anecdotal commentary from the MGP midwives in this study revealed a commonly held belief that younger women use text messaging to contact them more often than older women. It is possible that this stems from their belief that young women are the highest users of mobile devices and have a preference for text communication (Faulkner & Culwin, 2005; Haste, 2005). However this was not supported by study findings and may serve to

dispel the assumption that although young women use text to contact family and friends, that they would transfer this behaviour to their caseload midwife.

In general, the use of text messaging in health settings requires careful consideration of the variety and acceptability of text language, the influence of user age and gender (Faulkner & Culwin, 2005), personality traits (Holtgraves, 2011) and variations in health literacy (Kickbusch, 2001). The regular use of text in caseload midwifery in this study highlighted the need for best practice guidelines in Australian maternity settings and how any such guidelines will require continual revision to reflect local circumstances and advances in mobile technologies.

The finding that MGP midwives had contact with women when off-duty indicated that although they are required by their employer to divert their phones to their practice partners and turn their phone off during this time, this did not always occur. Participants reported that when off-duty they continued to receive text messages (4%; 66/1,442) and phone calls (2%; 31/1,442) and have face-to-face contact (0.5%; 6/1,442) with women. The finding that the highest volume of off-duty contact was in the antenatal period and via text indicates that when off-duty, caseload midwives, after diverting calls to their backup midwives either accidentally, or intentionally, left their phones on (thus allowing texts to be received). Although the off-duty contact was low overall (7%; 103/1,442), it is nonetheless of significance as it occurred more often with some midwives than others, highlighting individual practice discrepancies which may give inconsistent messages (regarding contact) to the women being cared for. Maintaining contact with women whilst off-duty is in breach of employer expectations, as receiving texts whilst off-duty involves the midwife having to manage the message content compromising her time away from work. Additional findings from this case study were reported in the publication (Forti et al., 2013) (Appendix 11).

Strengths and limitations

Although the findings from this Case Study have been generated in the context of a particular maternity setting, the findings are likely to be transferrable to other settings where MGPs operate in similar ways. As the intention of this study was to explore modes of routine communication between midwives and women in the antenatal and postnatal period, the omission of face-to-face contact with clients in labour was justified. Details of the number and timing of this type of contact was therefore under-represented, although other

labour-related contact including texts and phone calls, were included. The accuracy of collected data was reliant on midwives self-recording and hence, over or under-estimation of time, and other aspects under study, may have occurred. As texting is dependent on the complexity and length of the text involved as well as the dexterity of the operator, the two-minute allocation for texting was applied. This may have over or under estimated the actual time taken which is only achievable through examination of phone data, which was outside the scope of this study.

Despite each client episode being recorded separately, the identity of individual women was not recorded, and thus it was not possible to determine if contact was with the same or different women, on each occasion. In the absence of access to transcripts of text message content, it was not possible to assess whether communication with women was used for administrative, information, or consultation purposes; this requires further research.

Implications for practice

The contact between midwives and women within social hours is reassuring for midwives considering employment in caseload midwifery as this is known to be a deterrent to midwives wishing to work in the care model, but who have concerns about the on-call component. The high percentage of woman-initiated contact in the antenatal period and outside of usual hours provides information about how to manage and organise caseload midwifery care to meet the needs of women.

The use of text as a communication strategy raises issues regarding data security and retrieval, accountability, and confidentiality, as the use of text in the delivery of Australian caseload midwifery is currently unregulated and governance for safe practice is urgently needed. Issuing caseload midwives with phones which have advanced capabilities (i.e. smart phones) may assist midwives to document information about their contact with women, which is not generally considered an occasion of service and currently remains undocumented. It is also essential that midwives are able to contribute to the woman's medical record for the provision of *informational* continuity of care.

The contact midwives have with women during off-duty periods raises issues surrounding the midwives need for time away from work. This is an area which needs to be addressed in the study setting and other caseload model settings where this is likely to occur.

Additional issues to be addressed surrounding the use of mobile technologies include equity of access for women and available mobile phone credit, which may lead to women using text in preference to a phone call because of associated cost. Reliability and network coverage must also be considered, along with literacy issues, as this may preclude some women from using text as a means of contact.

Future research

Research which explores the content of text messages, clinical care and actions taken by caseload midwives would also be useful to inform policy and practice.

Achieving an understanding of why midwives leave their phone on when off-duty is an aspect of MGP practice requiring further investigation and research.

Conclusion

This Case Study confirms mobile technologies are a significant and evolving aspect of midwifery practice in MGP settings. The majority of contact with the primary midwife reiterates a key tenet of the caseload midwifery model. Having an understanding of the mode and timing of contact across the pregnancy continuum is useful for organising and managing services that meet women's needs. However, the absence of Australian guidelines for texting in midwifery practice is problematic and although the issue is being addressed within the study setting, national guidance is urgently needed.

Discussion

The aim of this thesis was to obtain a greater understanding of the discrete mechanisms and processes by which continuity is achieved in a caseload midwifery model. The study aims and objectives included specific measures of women's intrapartum contact with health professionals and the number of vaginal examinations women received, as well as an exploration of the modes of communication used between midwives and women in the antenatal and postnatal period.

Defining continuity of midwifery care and carer

The lack of a clear definition of midwifery continuity of carer has limited the understanding of how caseload midwifery works to improve outcomes for women. The exploration of specific aspects of caseload care delivery in this study allowed midwifery continuity of carer

in a caseload model to be examined further. The study also uncovered aspects of caseload midwifery care previously undocumented.

Exploring continuity from the perspectives of women, midwives and other health professionals is in keeping with the co-constructed definition of continuity (Parker et al., 2010). Applying a Case Study methodology to examine aspects of care delivery across the pregnancy continuum is consistent with the framework for evaluating complex interventions on three levels including theory and evidence, tasks and processes, and people and context (Blackwood, 2006). The detailed description of the intervention provided will also enable replication of study components (Craig et al., 2008) for women in both low and all risk models of care.

Although all three types of continuity (informational, relational and management) are applicable across all healthcare disciplines (Haggerty et al., 2003) the *relational* type of continuity has been associated more often with midwifery-led care. Examining certain aspects of midwifery continuity more closely for example intrapartum contact and modes of antenatal and postnatal contact, has enabled greater understanding of how the three discrete elements may interact.

The definition of continuity as the provision of maternity care by the same care providers throughout the pregnancy, birth and postnatal period (Commonwealth of Australia, 2008) was supported by study findings, where a significant majority of contact across the pregnancy continuum occurred between the woman and her primary or backup midwife. The achievement of continuity of carer is of significance as it is thought to facilitate the development of trust and the midwife-woman relationship within continuity models (Homer et al., 2008).

Midwifery continuity measures

In the literature, midwifery continuity has been measured using qualitative and quantitative methods. Quantitative methods have been criticised for failing to explore the *relational* aspect of midwifery continuity (Green et al., 2000) whereas qualitative studies often lack the level of detail required to link outcomes to care processes.

The *relational* element of midwifery continuity is most commonly measured using qualitative methods however; quantitative measures are required to assess how *relational*

continuity is facilitated within midwifery continuity models. The quantitative findings achieved in the two Case Studies described in this thesis add another measure of continuity. However, the study uncovered that these measures (i.e. text messages) were not being recorded in practice.

In particular the examination of the modes of communication used by women and caseload midwives in the antenatal and postnatal period provided valuable insights of how and when caseload midwives and women were in contact across the pregnancy continuum. It demonstrated how continuity of care was achieved through the use of mobile technologies and how the availability of 24 hour a day contact was utilised (Fereday et al., 2009). The limited amount of out-of-hours contact was a significant finding in this Case Study as reports of Australian (and overseas) caseload midwives' linking dissatisfaction with caseload care to the on-call component (Collins et al., 2010) encourage the belief among non-caseload midwives that the unsocial hours contact in caseload care is extensive.

The main concerns identified in these two Case Studies involved the practice of text messaging between midwives and women that are not documented in the medical records, caseload midwives contact with women when off-duty, and the low number of student midwives involved in intrapartum care. These outcomes are all currently being addressed in the Case Study setting.

Conclusion

Consumer demand, a strong evidence base, and the commitment of midwives to work to their full scope of practice have continued to drive the momentum for increased caseload midwifery models in Australian maternity care. Despite this, in the most recent national report, less than 10% of women across Australia have access to such models (Commonwealth of Australia, 2011). The most recent national midwifery workforce survey found continuity of midwifery carer after postnatal care and labour and birth care as the principal place of work for midwives (Australian Institute of Health and Welfare, 2013).

The anecdotal belief among midwives that the on-call requirement in caseload midwifery is too overwhelming potentially affects recruitment to the model. The low proportion of out-of-hours contact between caseload midwives and women demonstrated in this study has the potential to correct this perception.

The Case Study methodology assisted in the exploration of continuity of care in this study as it allowed the measurement of caseload midwifery care through two separate Case Studies, which each had different design methods. Although both were conducted in the same setting, each Case Study was able to explore different research questions, aims and objectives. In this way a detailed view of the caseload midwifery model was obtained. The flexibility of the Case Study methodology allowed Case Study One to be nested within a RCT, whereas Case Study Two was a cross-sectional observational design.

Caseload midwifery care is known to offer beneficial, safe and satisfying maternity care experiences for women and career satisfaction for midwives. However, further evidence is needed to unpack the discrete elements of midwifery continuity within the care model. By exploring key aspects of caseload care delivery for women of all risk status, within the context of a tertiary setting and the data presented in this thesis, a contribution to further the understanding of midwifery continuity of carer models has been made.

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Appendices

Appendix 1: Literature Review Protocol Template

Author/s:………………………………………………………………….

       Title:………………………………………………………………………

       Journal:……………………………………………………………………

       Year………………Volume:…………….Issue:……..Pages……………….

Type of study:　☐ Quantitative　☐ Qualitative　☐ Mixed Method

Location/Setting:……………………………………………………………….

Key Concepts/ Variables:

       Concepts:……………………………………………………………….

       Intervention/Independent Variable:…………………………………….

       Dependent/Variable:……………………………………………………

       Controlled Variables:……………………………………………………

Framework/Theory:………………………………………………………..

Design Type:　☐ Experimental　☐ Quasi-experimental　☐ Non-experimental

       Specific Design:…………………………………………………………

       Blinding? ☐ None　　☐ Single　　☐ Double

       Description of Intervention:……………………………………............

       Comparison Group(s):……………………………………………….

       ☐ Cross-sectional　　☐ Longitudinal/prospective

       No of data collection points…………

Qual. Tradition:　☐ Grounded Theory ☐ Phenomenology　☐ Ethnography ☐ Other

Sample:　　Size…………Sampling Method……………………………………..

       Sample characteristics……………………………………………………….

Data Sources: Type: ☐Self Report　　☐ Observational ☐ Biophysiologic ☐ Other

       Description of measures:………………………………………………..

       …………………………………………………………………………

       Data Quality: Level of Evidence I II III IV V VI VII

       Quality Summary Score A B C D

Statistical Tests: Bivariate: ☐ T-Test ☐ ANOVA ☐ Chi-Square ☐ Person's *r* ☐ Other

       Multivar: ☐Multiple Regression ☐ MANOVA ☐ Logistic Regression

Findings:　　………………………………………………………………….

Effects/Sizes:……………………………………………………………………

Themes:………………………………………………………………………

Recommendations:……………………………………………………………….

Strengths:……………………………………………………………………….

Weaknesses…………………………………………………………………

Adapted from 'Literature review protocol' (Polit & Beck, 2010, p. 182)

Appendix 2: M@NGO RCT - Participant information sheet

PARTICIPANT INFORMATION SHEET

A randomised controlled trial of caseload midwifery care

The M@NGO Project: Midwives @ New Group practice Options

WHAT IS THIS RESEARCH ABOUT?

You are invited to participate in a research study of maternity care. We hope to learn about the differences between having the same midwife (or small group of midwives who you will get to know) for your entire pregnancy, labour, birth and postnatal time compared with having the usual care at this hospital. You were selected as a possible participant in this study because we are asking all women who book here over the next six months to consider if they would participate in the study. The research is funded by the National Health and Medical Research Council of Australia. The Mater Mothers' Hospital is the second site for this research with the trial commencing at the Royal Hospital for Women in Sydney.

IF I SAY YES, WHAT WILL IT INVOLVE?

If you decide to participate, we will randomly assign you to one or other of the care options. The amount of care you receive will not be different according to whether you are cared for by the caseload group of midwives or not. The only difference you will notice is that you may be given the name of a midwife or small group of midwives to contact instead of ringing the antenatal clinic or birth suite when you want advice.

CASELOAD MIDWIFERY CARE

Caseload midwifery is the care you receive with a named midwife who works within a small Midwifery Group Practice. The same midwife or her 'back up' partner provide care during your pregnancy, when you have your baby and in the first few weeks after you have your baby when you are getting breastfeeding established at home. You will get to know the other midwives in the Midwifery Group Practice so that if your caseload midwife is having her days off when you require care, you will have met the other midwives who can help. In the event that you have health problems identified at the time of booking in or problems develop during your pregnancy or birth, your care will also be overseen by obstetricians, specialist medical doctors or other health professionals as you require, as is the case with usual hospital maternity care.

USUAL HOSPITAL MATERNITY CARE

Usual Hospital Maternity Care is the care that you may be offered when you book in for maternity care at any public hospital. Midwives and/or doctors within the maternity service of a public hospital provide usual hospital maternity care. You may be booked to receive: midwife clinic care; doctor's clinic care; or general practitioner shared antenatal care; depending on the options available at the hospital. The only care option that is not standard at present is the Caseload midwifery care option where women receive care from the same midwife or small group of midwives for the entire pregnancy, birth and postnatal time.

ARE THERE ANY RISKS?

There are very few if any risks because the research has been carefully designed. We are doing the study because we need more information about the best way to offer maternity care for women booking at our hospital.

WHY HAVE I BEEN ASKED?

You have been asked because you are able to give us the information we need to find out about how to improve maternity care for women. All women who book at this hospital in the next six months will be asked if they would consent to being part of our study.

DO I HAVE TO SAY YES?

You don't have to say yes.

WHAT WILL HAPPEN IF I SAY NO?

Nothing. We won't contact you about this research again and you will receive the best care available at the hospital regardless of being involved in this study or not.

IF I SAY YES, CAN I CHANGE MY MIND LATER?

You can change your mind at any time and you don't have to say why.

WHAT DO I HAVE TO DO

If you agree to participate in the study a research midwife will randomly allocate you to either receive usual hospital maternity care or Caseload midwifery care. You will then be asked to sign a consent form by the midwife at either your first or an early antenatal visit.

If you are allocated usual hospital maternity care you will be given your next antenatal visit within the appropriate hospital clinic or model of care. You will be given a unique study number.

If you are allocated care with a Caseload midwife, the Caseload midwife will contact you to organise your next antenatal visit. You will also be given a unique study number.

The research team will collect information on your pregnancy, birth and postnatal care. You may also be offered a Women's Questionnaire to fill in during pregnancy, at six weeks after the birth of your baby, and at six months after the birth of your baby. All of your health and personal details recorded will be given a study code (number). This means that the researchers can use your study code to find out information about your health information and the pregnancy and birth information from your health records but only as it relates to this study. It will be de-identified which means we will not use your name at all.

WHAT IF I HAVE CONCERNS OR A COMPLAINT?

This study has been reviewed and approved by the Mater Health Services Human Research Ethics Committee and participants may **contact the Mater Research Ethics Coordinator** on 07 3163 1585, should they have any complaints about the conduct of the research, or wish to raise any concerns. The Research Ethics Coordinator may contact the Patient Representative or Hospital Ethicist at its discretion.

If you wish to withdraw from the study or have any questions or concerns relating to your involvement, you are welcome to contact the chief investigator at the Mater Site: Professor Sue Kildea (Tel: 07 3163 6388 or sue.kildea@mater.org.au).

If you have any problems or queries about the way the study was conducted, and you do not feel comfortable contacting the research staff, you may contact the Research Support Office within the hospital Tel: 07 3163 1585 and quote the M@NGO study. Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

Appendix 3: M@NGO RCT - Consent form

Consent Form to Participate in the Research Project **A RANDOMISED CONTROLLED TRIAL OF CASELOAD MIDWIFERY**	

I, _____

    (Name of participant)

of _____

    (Street)   (Suburb/town)   (State & postcode)

have been invited to participate in a research project entitled **A RANDOMISED CONTROLLED TRIAL OF CASELOAD MIDWIFERY**

In relation to this project I have read the Participant Information Sheet and have been informed of the following points:

1. Approval for the protocol has been given by the Human Research Ethics Committee (HREC) of the Mater Hospital

2. The aim of the project is to determine whether caseload midwifery care can reduce interventions such as Caesarean section and if it is as safe as usual hospital maternity care.

3. The results obtained from the study may or may not be of direct benefit to my medical management.

4. The procedure will involve the allocation of eligible women booking for maternity care with one of the following models of care as they are defined within the participant information sheet.

    Usual existing maternity care or

    Caseload midwifery care

5. There are no adverse effects or risks related to this project that the investigators are aware of.

6. My involvement in this project may be terminated if I decide to withdraw from the project.

7. Should I develop a problem which I suspect may have resulted from my involvement in this project or should I have any queries relating to my involvement in the study, I am   aware that I may contact – Professor Sue Kildea on 07 3163 6388

8. Should I have any concerns or I am unhappy with the conduct of this trial and I do not feel comfortable contacting the research staff, I am aware that I may contact the Research Ethics Coordinator on 07 3163 1585, or I may contact the Patient Representative or Hospital Ethicist at my discretion. If I do need to contact the Patient Representative I will have this form handy so I may readily quote the Protocol Number and Title of the Project to this person.

9. I can refuse to take part in this project or withdraw from it at any time without affecting my medical care.

10. I understand that participating in this Maternity Service Clinical Trial may or may not benefit my Maternity care directly however my participation may assist in the development of treatments and/or procedures for the future.

11. I understand that my research records will be stored in the following manner: in a locked cabinet and locked in the researchers' office. The research team, authorised personnel and regulatory entities may have access to my study records to protect my safety and welfare.

12. I consent to the collection, processing, reporting and transfer within or outside Australia of my personal and/or sensitive information for healthcare and/or medical research purposes. All data to be transferred will be de-identified, therefore not including my name, address or phone number. My information will be identified by my baby's date of birth, my Medical Record Number as well as a numerical random code.

13. I understand that my baby's date of birth, my medical record number and a unique study number will identify my medical information. This information is potentially identifiable but all precautions will be taken by the clinical staff to ensure the information will be kept confidential.

14. If the results of my tests or information regarding my medical history are published, my identity will not be revealed.

15. While participating in this study, I should not take part in any other research project without approval from all of the investigators. This is to protect myself from possible injury arising from such things as extra blood drawing, extra x-rays, interaction of research drugs, or similar hazards.

16. During the course of this study, I will be informed of any significant new findings (either good or bad) such as changes in the risks or benefits resulting from participation in the research or new alternatives to participation that might cause me to change my mind about participating. If such new information is provided to me, my consent to participate will be re-obtained.

17. In giving my consent, I acknowledge that the Government Health Department Officials, and the Clinical Trial Centre Staff directly involved in the study, may examine my medical records only as they relate to this project.

I declare that I am over the age of 18 years.

After considering all these points, I accept the invitation to participate in this project. I am aware that I will be given a copy of the Participant Information Sheet and Consent Form. I also state that I have/have not participated in any other research project in the past 3 months. If I have, the details are as follows:

_____

Dr/Midwife _____ on: _____

(phone and page numbers)

Date: _____ Signature: _____

(of participant/volunteer) (of witness)

Investigators' confirming statement:

I have given this research subject information on the study, which in my opinion is accurate and sufficient for the subject to understand fully the nature, risks and benefits of the study, and the rights of a research subject. There has been no coercion or undue influence. I have witnessed the signing of this document by the subject.

Date: _____

Investigator's Name: _____

Investigator's Signature: _____

Withdrawal from Participation

Protocol Title: <u>A RANDOMISED CONTROLLED TRIAL OF CASELOAD MIDWIFERY</u>

An option should I wish to withdraw my consent to participate in the research protocol entitled above is to contact the researcher and/or return this slip. I understand that if I withdraw from the research protocol my medical care, my relationship with the Hospital and medical attendants will not be affected.

Appendix 4: Case Study One - Data Collection tool

MANGO Folder as listed on MATRIX	
Trial allocation	
Model of care @ birth admission	
MGP name	
Risk status at booking	
Risk status at delivery	
Gestation at first MGP visit	
Obstetric Ultrasound	
Antenatal visits	
Visits with Primary MGP Midwife	
Visits with Backup MGP Midwives	
Obstetrician visits	
GP visits	
Core Midwife visits	
Admission in labour by	
Vaginal examinations in labour	
Baby caught by	
Professionals present in labour and amount of time with women	

Appendix 5: Case Study Two - Participant Information Sheet

Relational Continuity of Care in Midwifery Group Practice:

A Mixed Method Study

Principle Investigator: Amanda Forti - Research Midwife Mater Mothers Hospital and Higher degree Research Student ACU

Co-supervisor: Dr Helen Stapleton- Senior Research Fellow, ACU & Mater Mothers' Hospital.

Supervisor: Professor Sue Kildea - Professor of Midwifery Mater Mothers Hospital and ACU Phone (07) 31636335

WHAT IS THIS RESEARCH ABOUT?

This research is a sub-study of an existing research project called the M@NGO trial. The M@NGO title stands for *Midwives @ New Group Practice Options* and is a trial designed to compare the outcomes for pregnant women who are receiving their care by either Midwifery Group Practice or usual Hospital Maternity Care.

The sub-study will focus only on the Midwifery Group Practice and will explore the care model from the midwives perspective. It will look more closely at the way in which care is provided by the group in particular the concept of 'relational' (or interpersonal) continuity of care.

Continuity of care is where care is provided by the same midwife or small group of midwives throughout pregnancy and the postnatal period. 'Relational' continuity is the part of continuity thought to be most relevant to caseload care.

However, although 'relational' continuity is considered to be closely linked to the benefits of the caseload care, the concept remains poorly defined and largely unexplained and as it forms the basis of the caseload care model it has been chosen as focus of this study for that reason.

'Relational' continuity of care will be explored by obtaining two different types of information divided into Parts A and B of the study.

Part A will collect statistics on the number, time and type of contact the midwife has with their clients. Part B will gather information about how midwives perceive and describe the way they provide 'relational' continuity of care.

The aim of collecting different types of information from the same group is to learn more about how midwives in group practice meet the needs of their clients in the hope that it will contribute further understanding of how the caseload midwifery care model works to provide quality midwifery care.

IF I SAY YES, WHAT WILL IT INVOLVE?

All of the Group Practice Midwives at Mater Mothers Hospital will be made aware of the potential to take part in the study; however the numbers required differ for Parts A and B.

The number of participants required for the qualitative component (Part A) is unrestricted however a minimum one midwife from each of the group locations will be required. For the qualitative component (Part B) of the study one midwife from each of the group practice locations will be required. Participants will be made aware that they may express an interest to take part in both Parts A and B of the study, if they wish.

Midwives participating in Part A will collect statistical information over a two week period using a data collection tool. Midwives participating in Part B will provide information via one-to-one interviews.

Information for Part A and B will be collected over the same time period however it will be analysed separately. The results of the information gathered from Part A and B will be compared at the end of the study.

The information obtained will form part of a research project thesis required for the completion of a Masters by Research Higher Degree at Australian Catholic University (ACU) being undertaken by the principle investigator.

ARE THERE ANY RISKS?

There minimal if any risks of being involved in the study because the research has been carefully designed to protect participants from any harm. Due to small numbers and known profile of participants, total anonymity may not be able to be guaranteed, however every effort will be made to protect the identity of the participants and the sensitive information they provide. Human Research Ethics Committee (HREC) approval from Mater Health Services and Australian Catholic University (ACU) has been obtained prior to commencement of this study.

WHY HAVE I BEEN ASKED?

As Group Practice Midwives at Mater Mothers hospital you will be advised of the opportunity to participate as it is the midwives themselves who will provide the valuable and reliable information that is needed. Participating in research has also the potential to contribute to the midwives' practice development and professional experience. Ultimately, we are conducting the study because we need more information about the best way to offer maternity care for women booking at our hospital.

DO I HAVE TO SAY YES?

You don't have to say yes. Participation in the research study is voluntary.

WHAT WILL HAPPEN IF I SAY NO?

If you elect not to be involved you will not be identified as declining nor disadvantaged in any way for your decision.

IF I SAY YES, CAN I CHANGE MY MIND LATER?

You can change your mind at any time and you don't have to say why.

WHAT DO I HAVE TO DO

After you indicate your wish to participate to the principle investigator, arrangements for your consent and inclusion in the study will be made.

WHAT IF I HAVE CONCERNS OR A COMPLAINT?

This study has been reviewed and approved by the Mater Health Services Human Research Ethics Committee and participants may **contact the Mater Research Ethics Coordinator** on 07 3163 1585, should they have any complaints about the conduct of the research, or wish to raise any concerns. The Research Ethics Coordinator may contact the Patient Representative or Hospital Ethicist at its discretion.

If you wish to withdraw from the study or have any questions or concerns relating to your involvement, you are welcome to contact the chief investigator at the Mater Site: Professor Sue Kildea (Tel: 07 3163 6335 or sue.kildea@mater.org.au).

If you have any problems or queries about the way the study was conducted, and you do not feel comfortable contacting the research staff, you may contact the Research Support Office within the hospital Tel: 07 3163 1585 and quote the M@NGO sub- study. Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

Appendix 6: Case Study Two - Consent form

Unique study ID number

CONSENT FORM
Relational Continuity of Care in Midwifery Group Practice : A Mixed Method Study

Project Team Contacts:

Amanda Forti	Student Researcher Mater Mothers' Hospital. Ph. 07 3163 8111 page 4396
Helen Stapleton	Senior Research Fellow, ACU & Mater Mothers' Hospital. Phone 31636335
Sue Kildea	Professor of Midwifery, ACU & Mater Mothers' Hospital. Phone 07 3163 6335

I have:

- Read and understood the information sheet or have had it explained to me;
- Had any questions or queries answered to my satisfaction;
- Been informed that the confidentiality of the information collected about me will be maintained and safeguarded;
- I am aware that my participation in either Part A and/ or Part B of the project is voluntary and that I am free to withdraw from the project at any time without comment or penalty;
- Agreed for the research team use only information relevant to the study and all such information is kept confidential, and cannot be traced back to me.

I agree to participate in the following parts of the study:

Part A – Data collection of client contacts over a 2 week period   YES/NO

Part B –1:1 Interview (N/A to this study)   YES/NO

   - Receive feedback of collated key findings   YES/NO

<u>Participant</u>

Name (please print clearly):

...

Signature: **Date: /   /**

...

<u>Witness (Researcher)</u>

Name: **Signature:**   **Date: /   /**

... .

This study has been approved by the Mater Health Services Human Research Ethics Committee and participants may contact the Mater Research Ethics Coordinator on 07 3163 1585, should they have any complaints about the conduct of the research, or wish to raise any concerns. The Research Ethics Coordinator may contact the Patient Representative or Hospital Ethicist at its discretion.

Appendix 7: Case Study Two - Data Collection tool

MGP Client Contact													Unique Study ID Number:

DAY : MONDAY   * Minutes - enter number   **ToD – 24hr time

DATE :   For ALL other boxes use √

	MinnnsnNS*	ToD**	On call	Off Call	Day Off	Planned	Unplanned	MW1	MW2	Primi	Multi	YW	AN (wks)	PN (Days)
VISIT														
PHONE														
TEXT														
EMAIL														

Visit – F2F contact with client
Phone – Phone call to/from client
Text - Text to/from client
Email – Email to/from client

Mins – Time taken in mins
ToD - Time of day
On Call- On duty
Off Call - >12 hrs in 24 hrs
Day Off – Day off
Planned – Scheduled
Unplanned- Unscheduled

MW1 – Primary midwife
MW2 – Backup midwife
Primip – Nil previous births
Multip – > 1 previous births
YW – 21yrs or under at booking
AN – Antenatal gest in weeks
PN – Postnatal days

Appendix 8: Human Research Ethics Committee approval letters

Mater Health Services HREC approval letter (Case Study One)

Ethics file

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MATER HEALTH SERVICES HUMAN RESEARCH ETHICS COMMITTEE

15th June 2010

Professor Sue Kildea
Obstetrics and Gynaecology
Mater Mothers' Hospital

Dear Professor Kildea,

Re: Protocol *Ref N°. 1526M* A Randomised Controlled Trial (RCT) of Caseload Midwifery : The M@NGO trial

I write to advise that the Mater Health Services Human Research Ethics Committee considers the above study to meet the requirements of the *National Statement on Ethical Conduct in Human Research* (2007) and has granted ethical approval for your research proposal. Please accept our very best wishes for the success of this study. *In all future correspondence with the Committee please quote the Mater reference number.*

Documents reviewed and approved include:

- Letter dated 15th April 2010 outlining request
- Mater Ethics Coversheet
- NEAF
- Protocol Version M@NGO-V1-150410
- Letter dated 12th November 2009 – successful grant application
- Curriculum Vitae – Professor Sue Kildea
- Participant Consent Form, MMH, Version 150410
- Participant Information Sheet
- Staff Information Sheet
- M@NGO Information Brochure
- M@NGO Antenatal Questionnaire
- M@NGO Woman's Questionnaire: 6 weeks after the birth of your baby
- M@NGO Woman's Questionnaire: 6 months after the birth of your baby
- MBI – Human Services Survey
- Letter dated 25th September 2008 – Ethics approval from Northern Sydney Central Coast
- Letter dated 7th July 2009 – Ethics approval of amendment from Northern Sydney Central Coast

This approval is valid until **15th June 2013**. Please note the following conditions of approval.

- Any departure from the protocol detailed in your proposal must be reported immediately to the Committee.
- When you propose a change to an approved protocol, which you consider to be minor, you are required to submit a written request for approval to the Chairperson, through the Secretary. Such requests will be considered on a case by case basis and interim approval may be granted subject to ratification at the next meeting of the Committee.

- Where substantial changes to any approved protocol are proposed, you are required to submit a full, new proposal for consideration by the Human Research Ethics Committee.
- You are required to advise the Research Ethics Coordinator immediately of any complaints made, or expressions of concern raised, in relation to the study, or if any serious or unexpected adverse events occur.
- Under the *NHMRC National Statement on Ethical Conduct in Research Involving Humans*, research ethics committees are responsible for monitoring approved research to ensure continued compliance with ethical standards, and to determine the method of monitoring appropriate to each project. You are required to provide written reports on the progress of the approved project annually, the first report being due on **date** and finally on completion of the project. *(The Progress Report is located at http://www.mater.org.au/Home/Research/Human-Research-Ethics-Committee.aspx or can be accessed through the Mater Intranet, Applications, Research Register then under the project name or alternately can be emailed to you).* Please inform the Committee of publications, presentations at Conferences, education and quality improvement outcomes from this study. The Committee may also choose to conduct an interim audit of your research.
- Please be aware that all study procedures including follow up of participants and data analysis should be completed within the approval time frame or an extension should be requested.

Please contact the Executive Director in the participating hospital/hospitals prior to commencing of the study. To access medical records, for the purpose of this study, please provide a copy of this approval letter to the Corporate Health Information Manager. I would also be grateful if you could confirm the date of commencement. (All correspondence should be directed to the Mater Research Ethics Coordinator.)

Yours sincerely

Dr Helen Liley
Chairperson
Mater Health Services Human Research Ethics Committee

Mater Health Services HREC approval letter (Case Study Two)

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MATER HEALTH SERVICES HUMAN RESEARCH ETHICS COMMITTEE

5th May 2011

Ms Amanda Forti
Level 3 Quarters Building
Annerley Rd
Woolloongabba Qld 4102

Dear Ms Forti

Re: Protocol *Ref № 1718QA* Continuity of Care in Midwifery Group Practice: An Exploration of Midwives
Understandings

I write to advise that the Mater Health Services Human Research Ethics Committee has reviewed this research project and recognises that the project meets the requirement for Low and Negligible Risk Research as set out in the National Statement (Section 5.1.18 – 5.1.21) and has granted ethical approval for your research project. Please accept our very best wishes for the success of this research project. *In all future correspondence with the Research Ethics and Governance Office please quote the Mater reference number.*

Please note the following conditions of approval.
- The Principal Investigator has responsibility for ensuring that the project is conducted in accordance with the National Statement, with relevant legislation and with Mater Health Services and responsibility for monitoring compliance rests with your Head of Department.
- Any departure from the protocol detailed in your proposal must be reported immediately to the Human Research Ethics Committee.
- When you propose a change to an approved protocol, which you consider to be minor, you are required to submit a written request for approval to the Chairperson, through the Research Ethics and Governance Office. Such requests will be considered on a case by case basis and interim approval may be granted subject to ratification at the next meeting of the Human Research Ethics Committee.
- Where substantial changes to any approved protocol are proposed, you are required to submit a full, new proposal for consideration by the Human Research Ethics Committee.
- You are required to advise the Research Ethics Coordinator immediately of any complaints made, or expressions of concern raised, in relation to the study, or if any serious or unexpected adverse events occur.
- To access medical records, for the purpose of this study, please provide a copy of this approval letter to the Health Information Services and Privacy Office (if applicable).
- The Research Ethics and Governance Office may choose to conduct an interim audit of your research project.

Yours sincerely

Dr Andrew Crowden
Chairperson
Mater Health Services Human Research Ethics Committee

Appendix 9: M@NGO protocol BMC pdf publication

BMC
Pregnancy & Childbirth

STUDY PROTOCOL   **Open Access**

A randomised controlled trial of caseload midwifery care: M@NGO (Midwives @ New Group practice Options)

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Abstract

Background: Australia has an enviable record of safety for women in childbirth. There is nevertheless growing concern at the increasing level of intervention and consequent morbidity amongst childbearing women. Not only do interventions impact on the cost of services, they carry with them the potential for serious morbidities for mother and infant.

Models of midwifery have proliferated in an attempt to offer women less fragmented hospital care. One of these models that is gaining widespread consumer, disciplinary and political support is caseload midwifery care. Caseload midwives manage the care of approximately 35-40 a year within a small Midwifery Group Practice (usually 4-6 midwives who plan their on call and leave within the Group Practice.) We propose to compare the outcomes and costs of caseload midwifery care compared to standard or routine hospital care through a randomised controlled trial.

Methods/design: A two-arm RCT design will be used. Women will be recruited from tertiary women's hospitals in Sydney and Brisbane, Australia. Women allocated to the caseload intervention will receive care from a named caseload midwife within a Midwifery Group Practice. Control women will be allocated to standard or routine hospital care. Women allocated to standard care will receive their care from hospital rostered midwives, public hospital obstetric care and community based general medical practitioner care. All midwives will collaborate with obstetricians and other health professionals as necessary according to the woman's needs.

Discussion: Data will be collected at recruitment, 36 weeks antenatally, six weeks and six months postpartum by web based or postal survey. With 750 women or more in each of the intervention and control arms the study is powered (based on 80% power; alpha 0.05) to detect a difference in caesarean section rates of 29.4 to 22.9%; instrumental birth rates from 11.0% to 6.8%; and rates of admission to neonatal intensive care of all neonates from 9.9% to 5.8% (requires 721 in each arm). The study is not powered to detect infant or maternal mortality, however all deaths will be reported. Other significant findings will be reported, including a comprehensive process and economic evaluation.

Trial registration: Australian New Zealand Clinical Trials Registry ACTRN12609000349246

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Background

Australia has an enviable record of safety for women in childbirth [1]. There is nevertheless growing concern at the increasing level of intervention, cost and consequent morbidity amongst childbearing women [2]. Rising intervention rates are most clearly reflected in the changes in rates of caesarean section which have increased over time. In 1991, only 19.0% of births were via caesarean section. By 2006, 31% of all births were via caesarean [1]. In addition to caesarean section, population based research in Australia revealed that amongst women with uncomplicated pregnancies, a third of all women currently have some form of intervention such as an induction or augmentation of their labour combined with an epidural [3]. Cost modelling of these interventions showed a relative cost increase of up to 50% for low risk primiparous women and up to 36% for low risk multiparous women as labour interventions accumulated [4].

Not only do interventions impact on the cost of services, they carry with them the potential for serious morbidities for mother and infant. Over a decade ago a large population based study in Victoria found that more than nine out of ten women had at least one significant medical complaint after giving birth [5]. Compared with spontaneous vaginal births, women having an instrumental birth had increased odds for perineal pain (OR 4.69, 95%CI 3.2-6.8) sexual problems (OR 2.06, 95% CI 1.4-3.0), and urinary incontinence (OR 1.81, 95% CI 1.1-2.91) [5]. Other studies have shown that a first birth by forceps delivery can cause a two-fold increase in the risk of having persistent faecal incontinence, and in about half these cases faecal incontinence may persist for at least five years [6]. Caesarean births carry the risk of increased perinatal mortality in subsequent pregnancies[1,7,8] and the risk of morbidity associated with surgery[9] and possible maternal complications in subsequent pregnancies (e. g., uterine rupture, placenta praevia, and placenta accreta) [10,11]. Operative birth also increases the fetal risks of respiratory distress syndrome [12] persistent pulmonary hypertension,[13] and admission to special care or neonatal intensive care nurseries particularly if the caesarean section is performed before the onset of labour [12,14,15]. Australian research into the rates of admission to neonatal intensive care of term babies of low risk women found the overall rate of admission is currently as high as 7.32% amongst low risk women [15].

An intervention that could lower rates of caesarean section, instrumental birth and epidural analgesia with no increase in mortality or morbidity for the mother or baby would improve the quality of maternity care, reduce unnecessary or harmful interventions and be cost effective.

No intervention reported in the Cochrane Library of systematic reviews of pregnancy and childbirth has had a more significant effect on lowering rates of intervention during childbirth than 'continuity of care' [16]. However, in Australia at present fewer than10% of women have access to continuity of care [17] and some women may meet up to 20 different midwives or caregivers from the time they begin antenatal care until the baby is born and the mother is discharged from postnatal care. Models of midwifery have proliferated in an attempt to offer women more continuity of care. We proposed to compare the outcomes and costs of caseload midwifery care compared to standard or routine hospital care for childbearing women through a randomised controlled trial.

Caseload midwifery

The aim of caseload midwifery is to provide women with the same midwife (or small group practice of midwives) to look after them from booking in through until the time they are discharged from care at about four to six weeks following the birth of the baby.

Despite the substantial health care costs associated with maternal and infant health, there are minimal data on the cost effectiveness of maternity care offered in the public (or private sector) in Australia. Allocating finite resources in ways that are most effective in improving health outcomes continues to be a challenge [18]. As yet there is no cost benefit analysis of the caseload midwifery model for women of all risk anywhere in the world.

There remains continuing uncertainty and debate about the risks, benefits and costs of midwifery led models versus other models of maternity care [16,19,20]. Several large national reviews [17,21] and a workforce study [22] identified that the current limited and inflexible scope of practice negatively affects Australian midwives' sense of satisfaction with their employment. The Commonwealth Health Workforce Review [23] found that workforce shortages, inflexibilities and inefficiencies in workplace arrangements are major contributors to poor health outcomes.

We plan to implement and evaluate Midwifery Group Practices at two large teaching maternity hospitals in Australia to compare the outcomes and costs of caseload midwifery care and standard or routine hospital care for childbearing women.

Ethical approval and site specific ethical approval was received from all University and Area Health Service Human Research Ethics Committees governing the study sites: University of Sydney HREC approval REF NO 12068; Lead HREC approval REF NO 0805072M.

Methods/design

The study uses a pragmatic two arm, unblinded rando-mised controlled design, to compare caseload midwifery care with standard maternity care.

Aims and Objectives

The aim of the study is to compare the outcomes and costs of caseload midwifery care compared to standard or routine hospital care for childbearing women through a randomised controlled trial.

Primary objectives are to determine whether women receiving caseload midwifery care experience the same rates of caesarean section, instrumental births and use of epidural analgesia compared to women receiving rou-tine care and to determine whether women with identi-fied risk factors at the onset of labour experience the same rates of neonatal morbidity (including admission to the neonatal intensive care unit), and perinatal mor-tality compared to routine care.

We will determine whether caseload midwifery care costs the same as routine maternity care and whether women who receive caseload care experience the same potential benefits and consequences of postnatal care as women receiving routine maternity care.

Secondary objectives are to determine whether mid-wives offering caseload practice experience the same levels of work satisfaction and the same levels of pro-ductivity as midwives working in conventional rostered and rotating shifts; and to determine whether obstetri-cians working with caseload midwives experience the same levels of professional satisfaction as obstetricians working with rostered midwives in the routine work set-ting. We will also determine the rates of postnatal depression and smoking in pregnancy.

Outcome measures

The *primary maternal outcomes* of the study are the proportion of women in each arm of the study:

- having caesarean section operations,
- instrumental births
- spontaneous vaginal births
- epidural analgesia for labour and birth

The *primary neonatal outcomes* of the study are the proportion of infants in each arm of the study who have:

- Apgar scores less than or equal to 7 at 5 minutes
- preterm birth (less than 37 completed weeks)
- admission to special care nursery or neonatal intensive care unit;

Secondary maternal outcomes include the proportion of women in each arm of the study who have:

- antenatal admissions
- induction and/or augmentation of labour
- women who are breastfeeding at six weeks and six months

Cost outcomes include:

- Comparative average cost per mother and baby episode as an AR-DRG

In addition to the primary outcomes listed above we will report on

Other neonatal outcomes including: low birth weight (less than 2500 g); length of neonatal hospital stay; neo-natal convulsions; neonatal trauma (fracture or palsies); neonatal resuscitation: use of neonatal respiratory sup-port (mechanical ventilation/CPAP) and/or perinatal mortality.

Other maternal outcomes include the rate of maternal complications (e.g. hypertension, ante partum haemor-rhage, cord prolapse etc) and miscarriages in both the intervention and control arms; the proportion of women who have perineal trauma (episiotomy, 1st, 2nd, 3rd or 4th degree perineal tear, sutures required); postpartum haemorrhage (more than 500 ml or any amount which causes deterioration in maternal health; and/or blood transfusion); and serious maternal complications (e.g. intensive care unit admission or death).

Although the study is not powered to detect other related outcomes including measures of perinatal mortal-ity (e.g. fetal or neonatal death,) or maternal mortality, these events will be reported in full.

Study population

Pregnant women booking in to give birth at one of two sites during the recruitment period will be invited to participate in the study and will be randomly allocated to caseload midwifery care versus routine care according to a post-consent method using accepted concealment measures endorsed by the NHMRC. The two sites are - large tertiary maternity hospitals in Sydney (site 1) and Brisbane (site 2).

Study Power

With 750 women or more in each of the intervention and control arms the study is powered (based on 80% power; alpha 0.05) to detect a difference in caesarean section rates of 29.4 to 22.9%; instrumental birth rates

from 11.0% to 6.8%; and rates of admission to neonatal intensive care of all neonates from 9.9% to 5.8% (requires 721 in each arm). The study is not powered to detect infant or maternal mortality, however all deaths will be reported. Secondary outcomes will include rates of smoking cessation (eg 14.8% to 9.9% needing 747 women in each arm) and breastfeeding initiation and duration. We have calculated a sample to include a 30% attrition rate; therefore we aim to recruit a total of 1,950 women. All outcome measures identified by the Cochrane Protocol [19] will be collected. Individual hospital data bases and a purposefully designed data base will collect all primary and secondary outcome and process measures in addition to most cost outcome measures.

Definitions of Control and Intervention

The lead professional for the continuum of the antenatal, intrapartum and postnatal periods will be the criterion for the classification of care as caseload midwifery or routine (medical doctor-led) care [19].

CONTROL *Standard or Routine care*: the designated obstetrician is the lead professional. Women are booked under the hospital consultant on call for the day of booking, and the responsibility for the delivery of care, from initial booking through the postnatal period, rests with the public maternity hospital service. Women allocated to the control group can choose from the standard hospital options for care which include midwives clinic antenatally; GP shared care antenatally; followed by general public hospital care in labour and in the postnatal ward. This may involve women seeing a different midwife for every visit; care by junior medical obstetric staff; or shared care with an accredited general medical practitioner (GP) (i.e. the GP provides the woman's antenatal care, usually nearer to her home, but the woman is booked for extra antenatal care, labour, birth and postnatal care at the hospital). Women may see an obstetrician during pregnancy with other referrals or consultation as necessary. When women come into the hospital for labour, birth and postnatal care they will be cared for by whichever midwives and doctors are rostered for duty. For women in the control and intervention arms at each site the care will be provided according to the same hospital guidelines and protocols of each site.

INTERVENTION *Caseload Midwifery care:* Women allocated to the caseload intervention will receive antenatal, intrapartum and postpartum care from a named caseload midwife who will be backed up when necessary by other caseload midwives from within her Midwifery Group Practice. Each named caseload midwife works in a Midwifery Group Practice of four full time equivalent midwives each working a cycle of 152 hours during each four week period. Caseload midwives

must be independent of the hospital rosters and employed on an annual salary to allow for workload to be self managed within each Midwifery Group Practice and responding to the needs of the women in their caseload. The named midwife is on call for the woman's labour and birth except in designated circumstances such as annual leave; sick leave; having more than one woman in labour; or if it is on one of the two days per week that the named midwife is scheduled to not work or be on call. Care will then be provided by a back-up caseload midwife from the Midwifery Group Practice. The caseload midwife is the woman's lead professional but one or more consultations with medical doctors may be part of routine practice [24]. Midwifery care is offered simultaneously with medical care if required. In addition to providing care until after the birth of the baby, the named caseload midwife (or a back up midwife from the Midwifery Group Practice) will attend the hospital on most days to provide some postnatal care until discharge and will provide full domiciliary care following discharge from hospital. Care will be provided according to hospital guidelines and protocols for up to six weeks following birth.

Trial Eligibility

Women will be eligible for trial entry if they are less than 24 completed weeks of pregnancy and a minimum of 18 years old at booking in. At the participating centres research midwives will recruit the required number of women in the experimental arm over 24 months. We will enroll 1950 women in anticipation of no more than a 30% attrition rate.

Exclusions

Women will be excluded from the trial if they are electively booked to give birth via caesarean section at the time of booking in; or are already booked with a named care provider (Obstetrician/GP/midwife).

Trial Recruitment

At site [1] women will be recruited using three strategies depending on point of first contact.

1. When the woman contacts the hospital by phone for booking, the administration desk will send out information leaflets informing women of (a) the opportunity to book with a caseload midwife as part the care offered at the hospital and (b) inviting them to participate in the study before the first visit to the hospital antenatal clinics. Women will attend the hospital antenatal clinic for their booking visit. At the first visit (booking clinic) women will be seen by a research midwife who ascertains if the woman has previously received written information and if so, she will be invited to participate. Following written consent, the midwife will randomise the woman to the intervention caseload midwifery care with a

named midwife or routine care via a central telephone randomisation service (NH&MRC method); and enter details on the Trial Register and Daily Log Book. (The NHMRC administered telephone randomisation method guarantees both random sequence generation and allocation concealment according to CONSORT guidelines).

2. When a booking referral from the woman's General Practitioner is sent to the hospital, the administration desk contacts the woman and informs the woman of (a) the opportunity to book with a caseload midwife as part the care offered at the hospital, and (b) if eligible invite them to participate in the study before the first booking visit. Interested women will be sent information leaflets. The woman is contacted by phone by the research midwife to ensure the information has been received, assess the woman's understanding of the study, answer any questions, and obtain verbal consent to participate and be randomised. Once verbal consent is obtained the trial procedure is the same as that above and her details are entered onto the Trial Register and Daily Log Book. Consent is formalised in writing at the first booking visit. At this stage, if the woman declines to give written consent or is ineligible, she is not enrolled in the trial. Women not wishing to participate in the study will progress through the antenatal clinic as usual.

3. When the woman has not received written information, at the booking clinic, she will be seen by a research midwife, who will provide her with written information and an opportunity to discuss the study. Before being invited to participate in the study, the woman will be given the opportunity to defer her decision to participate until the next antenatal appointment where she will be seen again by the antenatal clinic midwives and the research midwife. If the woman wishes to decline or accept the invitation to participate at this first visit, she may do so. She may contact the research midwives at a later time to participate in the study. Once women have given written consent to be involved in the trial, the trial procedure is the same as that above. Details of these women will also be recorded in the Trial Register and Daily Log Book Women not wishing to participate in the study will progress through the antenatal clinic as usual.

At Site 2 pregnant women will be randomly allocated to caseload midwifery care or routine care during pregnancy.

1. On receipt of referral from the general practitioner, the GP Liaison will identify women eligible

for caseload care. This process is guided by availability of places on caseload group practice models of care in association with the locality of the home address of women who book.

2. Women who qualify on these grounds will be telephoned to be informed of their acceptance to book at Site 2 and the availability of caseload midwifery care in their area. They will have the models of care briefly outlined, and be invited to participate in the trial.

3. Interested women will receive a brochure on models of care, and a M@NGO trial brochure in the post.

4. One week following postage, the research midwife will provide a follow up phone call to ensure the information was received, assess the woman's understanding of the study, answer any questions, and obtain verbal consent to participate and be randomised. We do not expect that this will create unnecessary delays as at present women may wait several weeks before they receive a letter confirming their acceptance to Site 2, with the models of care brochure and a booking appointment.

5. Once verbal consent is obtained and documented, the research midwife will randomise the woman to caseload or routine care via a central telephone randomisation service (NH&MRC method); and enter details onto the Trial Register and Daily Log Book

6. At the first booking visit women who were telephone randomised to take part in the study will confirm and formalise participation in the trial by giving written consent at the first booking visit in the home.

7. In the standard care model written consent will be obtained at the first booking visit in the hospital or community-based antenatal clinic.

8. At this stage, if the woman declines to given written consent or is ineligible (meets exclusion criteria) she is excluded from trial, and her care will be 'as usual' i.e. standard care.

Once women have given written consent to be involved in the trial, the trial procedure is the same as Site 1 above. Women not wishing to participate in the study will progress through the hospital or community antenatal clinics as usual. Details of these women will also be recorded in the Trial Register and Daily Log Book.

Differences between Site 1 and Site 2
Although there is a slight difference in the recruitment process for the trial at the two sites, the integrity of the randomisation process is safeguarded by the fact that there is equipoise in the decision process for women

regarding which model of care they will receive. Women who have a stated preference for either model are not invited to be randomised to a model of care. The proposed recruitment method for Site 2 differs slightly from the process employed at site 1 on two counts:

> i. At site 1 all women attend a first booking visit at the hospital antenatal clinic before they are allocated to a model of care, including caseload care. At Site 2 women are allocated to a model of care, including caseload care by the GP Liaison, *prior to* the first booking visit.
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> ii. At site 1 the first booking visit occurs in the antenatal clinic, which enables research midwives' to provide information about the trial and obtain written consent. At Site 2 women are offered information by telephone and the initial consent is received by telephone. All women allocated to MGP have a home booking visit and do not attend the antenatal clinic at all. It is not feasible for the research midwife to accompany MGP midwives to every home visit to give information about the trial and obtain written consent in the first instance. See above the process for Site 2 to further clarify.

Analysis

Analysis will be by intention to treat which will include withdrawals and losses to follow up. There should be minimal differences in the baseline characteristics between groups due to the randomisation process. Statistical adjustment may be needed if important differences arise in baseline characteristics. Relative risks with 95% confidence intervals for the primary outcomes will be calculated. Measures of categorical data will be analysed with chi-squared tests and continuous data will be analysed with t-tests. Logistic regression and multiple linear regressions will be used if necessary to adjust for confounding for binary and continuous outcomes.

Risk will be controlled for in the statistical analysis and identified at the onset of labour rather than at enrolment in the study. Women will be categorised dichotomously as 'at low risk' and 'not low risk' according to maternal risk status at the time of the onset of labour. The risk factors and levels of risk are well defined in the ACM Guidelines [24] as level B or C - however, all definitions of risk will be available in the publication of the study.

Interim Analysis

A data monitoring group will look for differences between the groups that may be larger than expected as well as unanticipated adverse effects that may occur [25]. After 50% of the women have given birth a

difference of at least three standard deviations in interim analysis of a major endpoint is needed to justify stopping the trial. (All perinatal deaths will be reviewed by a multidisciplinary adverse events committee blinded to treatment allocation.) While it is not possible to blind participants to the model of care they receive, we will endeavour to blind the outcome assessments.

Cost methods

As no single outcome measure can encapsulate all benefits of treatment, the economic evaluation is based on a cost-consequence analysis [26]. We will determine the importance of each outcome measure relative to the costs if the caseload midwifery care and routine care costs are similar. The costs will be presented in terms of average cost per mother and baby and reported as a 'mother/baby episode' which includes the full episode of care. Costs will also be presented in actual Australian Revised Diagnosis Related Group (ARDRG) related funding terms for each arm of the study.

Expenditure data will be obtained from each hospital's financial system including detailed patient-level data on inpatient contacts for the mother and baby and the data related to the costing of medical and midwifery contact time during each mother/baby episode.

Qualitative methods

Women's Questionnaires

Women will be asked to assess the service through qualitative surveys offered at thirty six weeks, six weeks and six months postpartum. At six weeks women will be offered a survey tool based on the Oakley et al 'social support' questionnaire [27]. This questionnaire is validated for use amongst women considered to be both high and low risk as well as those of lower socio-economic status. At six months women will be offered the 36 item short form SF36 [28] which will provide subjective accounts of health following childbirth. We have chosen these tools rather than the conventional satisfaction type surveys because satisfaction may reflect whether or not expectations have been met rather than whether or not benefit has been achieved in the eyes of the woman and her family.

Questionnaires for Staff

The team plans to collaborate with researchers from the department of Organisation and Management at the Australian School of Business based at UNSW to undertake a rigorous assessment of employees' motivation, well-being and emotion management strategies, as well as the drivers and outcomes of these factors particularly in relation to measuring the effect of a new model of delivering midwifery care, compared to traditional models of delivering midwifery care.

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Confidentiality and Data Security

Participants in the trial will be identified by a study number only, with a master code sheet linking names with numbers being held securely and separately from the study data. See ethics section for storage and disposal details.

Group Allocation

The randomisation schedule will be prepared by a researcher not involved with treatment allocation. Following written informed consent from the woman, the research midwife will telephone the randomisation service. Details of the woman's consent and trial entry data will be recorded. The midwife will then be informed of the group (caseload midwifery or routine hospital care) to which the woman has been randomly allocated and the woman will be issued with a unique 4 digit study number. Study group allocation will be recorded on the Trial Register and Daily Log Book. To assess the comparability of the study groups, baseline demographic and medical information will be collected from the medical record at the time of entry into the study. Because the structure of practice is so different; there should be minimal opportunity for cross overs to occur. No attempt will be made to blind the identification of women randomised to either arm of the study.

Justification for RCT

The strength of the proposed experimental randomised design is the capacity to determine causality between the outcome variables (dependent variables) and the type of care received by women in each of the two groups (independent variables).

In a random assignment to each nominal group: the probability of being assigned to intervention or control is not dependent on pre-trial choice or preference and any other baseline patient characteristics. Women not allocated a caseload midwife will be cared for as usual in the routine hospital group by rostered midwives and rostered medical personnel. Some women may receive their antenatal care in a GP/shared care model and enter the hospital at the time of birth to be cared for by the rostered midwifery and medical staff on duty. Subjects will be analysed within the group to which they were allocated, irrespective of whether they experienced the intended intervention (intention to treat analysis). All exclusions will be reported.

Discussion

This trial will provide a comprehensive and rigorous evaluation of caseload midwifery maternity care. The evidence that this trial can provide is long overdue for maternity policy makers and service providers who are responsible for the effective design, delivery and costs of services that are the most frequent cause of hospitalisation in Australia today.

Restructuring maternity services to introduce caseload midwifery care involves radical changes to conventional or routine midwifery and obstetric practices [29-31]. All these changes make an impact on health planning and the allocation of finite resources [18]. Many innovations are introduced in a relative policy vacuum. Models of maternity care are no exception. This proposed trial is significantly innovative because it is designed to be undertaken on as a multisite study in two different states within Australia and includes women of *all risk* rather than *low risk* women. Because our proposed trial meets the criteria of the Cochrane Systematic Review of midwifery caseload care in methods; randomisation; definitions of the intervention and control arms; outcome measures and statistical analysis,[19] the results will contribute to a wider inquiry and meta-analysis in the future.

In addition to evidence on the experiences of women receiving caseload midwifery care and the experiences of obstetricians and midwives offering caseload care, the outcomes of the proposed trial will contribute:

1. Level 1 evidence of the safety and effectiveness of having a known caseload midwife for the continuum of pregnancy birth and postnatally.
2. Level 1 evidence of the safety and effectiveness of caseload midwifery care for women of all risk.
3. Level 1 evidence on the cost effectiveness of caseload midwifery care and routine obstetric care for all women.
4. 'Australian randomised controlled trial data to the Cochrane systematic review of midwife led care[19].

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Authors' contributions

ST conceived of the study, participated in its design and coordination, drafted the manuscript and gave final approval of the version to be published. SK participated in the study design and coordination and helped draft the manuscript. DH, BH, AL, JA, AF participated in the design of the study, helped draft the manuscript and are managing the day to day conduct of the study. AW participated in the study design and coordination

MT participated in the study design and coordination, helped to draft the manuscript and will perform the statistical analysis. JW is the overall manager of the midwifery group practices and participated in the study design and coordination. All authors read and approved the final manuscript.

Competing interests
The authors declare that they have no competing interests.

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Appendix 10: M@NGO Lancet publication

Caseload midwifery care versus standard maternity care for women of any risk: M@NGO, a randomised controlled trial

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Summary

Background Women at low risk of pregnancy complications benefit from continuity of midwifery care, but no trial evidence exists for women with identified risk factors. We aimed to assess the clinical and cost outcomes of caseload midwifery care for women irrespective of risk factors.

Methods In this unblinded, randomised, controlled, parallel-group trial, pregnant women at two metropolitan teaching hospitals in Australia were randomly assigned to either caseload midwifery care or standard maternity care by a telephone-based computer randomisation service. Women aged 18 years and older were eligible if they were less than 24 weeks pregnant at the first booking visit. Those who booked with another care provider, had a multiple pregnancy, or planned to have an elective caesarean section were excluded. Women allocated to caseload care received antenatal, intrapartum, and postnatal care from a named caseload midwife (or back-up caseload midwife). Controls received standard care with rostered midwives in discrete wards or clinics. The participant and the clinician were not masked to assignment. The main primary outcome was the proportion of women who had a caesarean section. The other primary maternal outcomes were the proportions who had an instrumental or unassisted vaginal birth, and the proportion who had epidural analgesia during labour. Primary neonatal outcomes were Apgar scores, preterm birth, and admission to neonatal intensive care. We analysed all outcomes by intention to treat. The trial is registered with the Australian New Zealand Clinical Trials Registry, number ACTRN12609000349246.

Findings Publicly insured women were screened at the participating hospitals between Dec 8, 2008, and May 31, 2011. 1748 pregnant women were randomly assigned, 871 to caseload and 877 to standard care. The proportion of caesarean sections did not differ between the groups (183 [21%] in the caseload group *vs* 204 [23%] in the standard care group; odds ratio [OR] 0·88, 95% CI 0·70–1·10; p=0·26). The proportion of women who had elective caesarean sections (before onset of labour) differed significantly between caseload and standard care (69 [8%] *vs* 94 [11%]; OR 0·72, 95% CI 0·52–0·99; p=0·05). Proportions of instrumental birth were similar (172 [20%] *vs* 171 [19%]; p=0·90), as were the proportions of unassisted vaginal births (487 [56%] *vs* 454 [52%]; p=0·08) and epidural use (314 [36%] *vs* 304 [35%]; p=0·54). Neonatal outcomes did not differ between the groups. Total cost of care per woman was AUS$566·74 (95% 106·17–1027·30; p=0·02) less for caseload midwifery than for standard maternity care.

Interpretation Our results show that for women of any risk, caseload midwifery is safe and cost effective.

Funding National Health and Medical Research Council (Australia).

Introduction

Australia has an enviable record of safety for women in childbirth.[1,2] Nevertheless, concern is growing about the increase in caesarean sections[3,4] and the potential long-term morbidity associated with the procedure.[5–7] To find ways to address this issue while maintaining high safety standards is an important aim in many countries.[8–10]

Standard hospital maternity care—the only option available to most childbearing women in Australia—is based on a fragmented system wherein women meet several different midwifery and obstetric staff at each consultation throughout pregnancy, birth, and the postnatal period.[2] We postulated that a restructuring of midwifery services to provide continuity of midwifery carer from booking to postnatal discharge in the community might reduce interventions in childbirth, reduce costs, and increase women's satisfaction. This restructured service is called caseload midwifery and aims to reduce the fragmentation of care and the need to have several different care providers for pregnancy and birth.

Investigators of a systematic review[11] reported substantial benefits for women at low risk of pregnancy complications who received continuity of midwifery care (a category that included caseload midwifery). In a randomised controlled trial[12] of low-risk women in Australia, caseload midwifery reduced interventions, including caesarean section, compared with standard care. However, no trial evidence exists for caseload midwifery care for women of all risk.

We undertook a randomised controlled trial to assess maternal and perinatal clinical outcomes and cost of care for caseload midwifery compared with standard maternity care for women of all risk.

Methods

Study design and participants

Midwives @ New Group practice Options (M@NGO) was an unblinded, randomised, controlled, parallel-group trial undertaken at two Australian centres (Royal Hospital for Women, Randwick, NSW [site 1]; and Mater Mother's Hospital, Brisbane, QLD [site 2]). Women aged 18 years and older were eligible to participate if they were less than 24 whole weeks pregnant at the first booking visit. Women were excluded if they had already planned to have an elective caesarean section, had a multiple pregnancy, or were planning to book with another care provider (eg, a general practitioner, caseload midwife, or private obstetrician).

Baseline demographic and medical information was obtained from medical records at the time of entry into the study. Gestational age was calculated from menstrual dates noted by the woman and usually confirmed in the first trimester through routine ultrasound dating. All data were entered into the hospital surveillance systems by the attending midwife and electronically collated and checked by the research midwives. For missing data and data that were not credible the notes were checked manually.

All participants provided written informed consent and remained identifiable throughout the trial. Overall and site-specific ethics approval was obtained from all relevant university and Area Health Service human research ethics committees. Detailed information about recruitment at each site is outlined in the protocol[13] and on the trial registration record. The M@NGO trial is registered with the Australian New Zealand Clinical Trials Registry, number ACTRN12609000349246.

Randomisation and masking

Pregnant women who contacted either participating hospital during the recruitment period in anticipation of booking to give birth were issued with information about the study before their formal booking was made. At the first face-to-face or formal booking visit they were invited to participate in the study. Those who agreed and provided written informed consent were randomly assigned by a telephone-based computer randomisation service either to caseload midwifery or to standard maternity care.[14] The telephone-based computer randomisation was provided by the Australian National Health and Medical Research Council clinical trials randomisation centre. Because of the nature of the trial, no attempt was made to mask study assignment from the participant or the clinician. Study assignment was masked from the statistician who analysed the data.

Procedures

Table 1 describes the differences between caseload midwifery care and standard maternity care. Women allocated to caseload midwifery care received antenatal, intrapartum, and postpartum care in hospital and in the community from a named (or primary) caseload midwife, who worked within a small group known as a midwifery group practice. The caseload midwives were backed up when necessary by other caseload colleagues and by hospital staff during the women's stay in the

	Caseload care	Standard care
Annual salary vs rostered shift work	Caseload midwives are employed on an annual salary; they work in cycles of 152 h over 4 weeks, and do not work in excess of 12 h consecutively in any 24 h period	Rostered midwives are paid on the basis of their years of service and whether they are full time (minimum 38 h per week) or part time; they are employed to provide a rostered service
Self-managed time vs rostered shifts	Caseload midwives potentially match workload to need; each midwife cares for about 40 women per year, and provides backup care for an additional 40 women	Midwives are rostered prospectively; to match actual workload and number of midwives prospectively rostered on any ward for any given shift is not possible
Continuity of carer vs fragmented care	Women receive continuity of care from a named midwife or her small group practice of midwives for duration of pregnancy, labour, birth, and postnatal care, ensuring consistency of advice and information	Routine care is offered by midwives working in designated separate ward or clinic areas; they do not have the opportunity to follow individual women through the duration of care
Named midwife vs unknown carer	Having a known or named midwife encourages women to become active participants in decision making about pregnancy care	Women booked under team of the day might feel uninvolved in decision making; exposure to several carers might make women anxious about having to repeat information
Individual antenatal assessment vs antenatal clinics	Antenatal assessments are tailored to the woman's needs in the community or home; combined antenatal and postnatal groups are possible	Women attend routine antenatal clinics in accordance with hospital policies; antenatal classes are offered in the hospital or community
Labour assessed before admission vs after admission	Women phone their caseload midwife to discuss the progress of labour before admission to the labour ward, thereby potentially avoiding unnecessary time spent in hospital and increasing the possibility of interventions to accelerate progress	Women phone the labour ward before arriving at the hospital at the onset of labour; they might not have previously met the midwife
Early discharge and home postnatal visits vs hospital postnatal care	Women are encouraged to go home early and are visited by their caseload midwife at home in the first few hours after birth, then at home or in the community for up to 6 weeks or ten visits	Women receive postnatal care in hospital; a domiciliary follow-up visit from a rostered community midwife might take place if the woman meets the criteria for early discharge—before 48 h for vaginal birth and 72 h for caesarean section
Consultation and referral	Collaboration between medical staff and caseload midwives is guided by the Australian national midwifery guidelines for consultation and referral[15]	Midwives have access to the Australian national midwifery guidelines for consultation and referral[15]

Table 1: Factors that differentiated caseload midwifery and standard care in the trial groups

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postnatal ward. The midwifery group practices consisted of four full-time midwives employed on an annual salary, meaning that they each worked a non-specified cycle of 152 h during a 4-week period. This flexibility enabled them to self-manage their workloads and respond directly to the needs of the women enrolled in their care.[16] The named midwife was on call for the labour and birth for their assigned women, except in designated circumstances such as annual leave, sick leave, having more than one woman in labour, or not being on call.

A senior obstetrician was allocated to each midwifery practice to enhance consultation and referral processes. This approach was based on the Australian national midwifery guidelines for consultation and referral.[15,17] Caseload midwives at both sites used these guidelines as a basis for appropriate risk management. When urgent assistance was needed in hospital it was provided by the rostered medical staff.

In addition to providing care throughout pregnancy, labour, and birth, the named caseload midwife (or a backup midwife if the named midwife was unavailable) attended the woman in hospital to provide postnatal care and advice until discharge. Women were encouraged to return home as soon as possible after birth. Women at both sites received postnatal care from their caseload midwife in their homes for up to 6 weeks, in accordance with each hospital's guidelines and protocols.

Women at both sites who were allocated to the control group chose from the standard hospital options for maternity care. The key difference between caseload midwifery and the control was that the standard care group did not receive substantial continuity of midwifery carer (table 1). Standard care at both hospitals included shared care from a general practitioner and hospital midwives (ie, the general practitioner provided the woman's antenatal care, usually closer to her home than the hospital, but the woman was booked for extra antenatal care, labour, birth, and postnatal care at the hospital). Standard hospital care was provided through antenatal clinics, labour wards, and postnatal wards, where care is provided by rostered medical and midwifery staff. In standard care, women could potentially see a different midwife for every visit.

Outcome measures
Outcomes were defined a priori.[13] The main primary outcome was the proportion of women who had a caesarean section. Other primary maternal outcomes were the proportion of women who had an instrumental vaginal birth or unassisted vaginal birth, and the proportion who had epidural analgesia during labour. Both study sites offer women comprehensive options for analgesia in labour; pharmacological methods were epidural analgesia (with combinations of local anaesthetic and opioids), intramuscular narcotics, and nitrous oxide. Instrumentally assisted birth was a combined measure

of vacuum-assisted or forceps-assisted birth. Primary neonatal outcomes were Apgar scores of 7 or less at 5 min, admission to special care nursery or neonatal intensive care unit, and preterm birth (gestational age <37 weeks).

Secondary maternal and infant outcomes were antenatal admission to hospital; induction or augmentation of labour; perineal status after birth; blood loss after birth; gestational ages and birthweights of the infants; breastfeeding at hospital discharge, 6 weeks and 6 months postnatally; and perinatal and maternal mortality.

Cost outcomes per woman were calculated with respect to the costs to the public hospital system. Both sites are large, metropolitan teaching hospitals. Both hospitals calculate patient costs on the basis of activity-based funding codes (Australian-refined Diagnosis-Related Group classification [DRG] codes). Expenditure data were obtained from the hospital financial systems, which provided detailed information about inpatient contacts for the mother and baby.

Linking clinical and cost databases is not routinely done. Therefore, to calculate the median cost difference between the caseload and standard care groups for the care of the mother, we linked three sets of data to bring together the full complement of information about cost and outcomes of patient care. The costing or hospital performance branch obtained data for actual and estimated direct and indirect costs from the various supply systems and cost centres in each hospital. Clinical costing is based on the alignment of the money spent in the hospital with the number of services each woman received during her hospital stay. The costs for all services used by each woman are then aggregated to determine a total patient cost. This cost was coded by hospital cost coders at the completion of care with the medical discharge summary and other sources, such as patient notes, to apply the national DRG codes.

Our research teams then matched the cost data (complete with DRG codes) with the hospital surveillance system (clinical and demographic) data at each site using the inpatient hospital number (medical record number) and the procedure date (from booking visit to 6 weeks postnatally). The cost reporting structures are standardised separately for each hospital site and the cost report for each individual woman was masked with respect to participation in the trial and to study group assignment.

The per-woman cost of care calculated includes both direct and indirect costs for each full episode of maternity care, taking account of the length of hospital stay for each woman. Direct and indirect costs were calculated for midwifery and obstetric clinical time; use of operating theatres, laboratory tests, imaging, wards, allied health, pharmacy; capital depreciation; and clinical overheads. Costs for each full episode of maternity care were calculated from the sum of the services provided to the

For more on **Diagnosis-Related Group classification** see https://nccc.uow.edu.au/ardrg/overview/index.html

woman for the duration of her stay. Further comprehensive cost analyses, including neonatal costs, will be reported elsewhere, as will the results of a survey to assess the participants' experiences and satisfaction with the different models of care.

Statistical analysis

We calculated the necessary sample size on the basis of our main primary outcome measure, with an expected reduction in the proportion of women undergoing caesarean section from 29·4% to 22·9%. These calculations were based on base rates available at site 1 at the time of study design. We calculated the potential change in these rates on the basis of the preliminary outcome data after the restructuring of the maternity service at site 1 and the introduction of the first midwifery group practices for all-risk women (for those who chose to have caseload care.) To detect this difference with 80% power and a type 1 error of 5%, 750 women for whom data could be analysed were needed in each group. With an assumption of 30% withdrawals or protocol violations, we aimed to recruit 1950 women. This number of participants would also provide adequate power to examine other outcomes such as a reduction in instrumental birth from 11·0% to 6·8% and admission of neonates to neonatal intensive care or a special care nursery from 9·9% to 5·8%. An independent data

monitoring committee reviewed unblinded data for safety after the first 1000 women in the study had given birth. In response to a lower than anticipated attrition rate, we stopped recruitment when 1748 had been randomly assigned.

We analysed all outcomes on an intention-to-treat basis using Stata version 12. We used univariate logistic regression to estimate odds ratios (ORs) with 95% CIs and Pearson χ^2 tests to calculate p values to compare proportions between the study groups for the main dichotomous outcomes. For non-normally distributed data we used non-parametric bootstrap percentile CIs to infer the observed significance of the effects. No interim analyses were planned and none were done. The
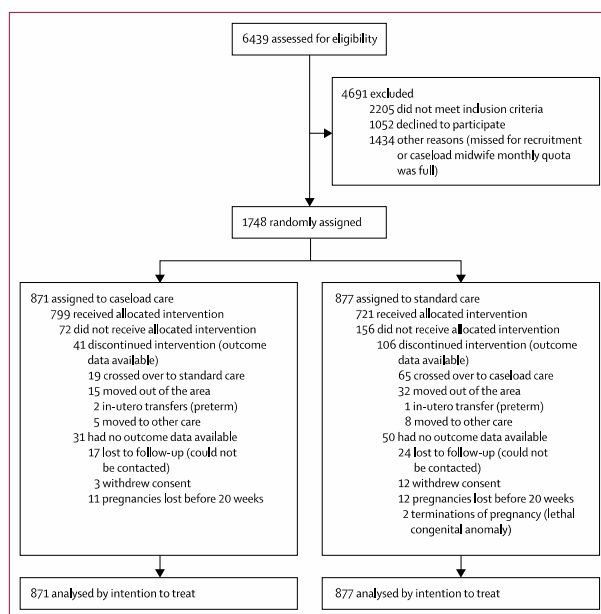

Figure 1: Trial profile

	Caseload group (n=871)	Standard care group (n=877)
Mean maternal age (years)	31·7 (4·8)	31·5 (5·0)
Maternal age group (years)*		
<20	3 (<1%)	10 (1%)
20–24	58 (7%)	69 (8%)
25–29	211 (24%)	215 (25%)
30–34	364 (42%)	322 (37%)
35–39	189 (22%)	202 (23%)
≥40	42 (5%)	44 (5%)
Missing data	4 (<1%)	15 (2%)
Parity		
Nulliparous	619 (71%)	605 (69%)
1	179 (21%)	206 (23%)
2	52 (6%)	50 (6%)
3	15 (2%)	8 (1%)
≥4	3 (<1%)	3 (<1%)
Missing data	3 (<1%)	5 (1%)
Identified risk at onset of labour		
None identified	359 (41%)	347 (40%)
Medical or obstetric risk factors†	512 (59%)	530 (60%)
Social risk factors†	190 (22%)	192 (22%)
Missing data	39 (4%)	66 (8%)
Mean BMI‡	22·8 (3·9)	23·2 (4·2)
BMI group		
Underweight (<18·6)	56 (6%)	53 (6%)
Optimum (18·6–24·9)	607 (70%)	570 (65%)
Overweight (25–30)	135 (15%)	153 (17%)
Obese (>30)	47 (5%)	67 (8%)
Missing data	26 (3%)	34 (4%)
Median SEIFA index	10 (8–10)	10 (8–10)

Data are n (%), mean (SD), or median (IQR). The Socio-Economic Indexes For Areas (SEIFA) method provides a measure of social and economic wellbeing for Australian communities; a score of 1 is the lowest and 10 the highest. BMI=body-mass index. *When missing data were included and χ^2 test done, p=0·028 (however, result was not significant when missing data were excluded). †Medical, obstetric, and social risk factors are categorised B or C (B=consult with a medical practitioner or other health-care provider; C=refer a woman or her infant to a medical practitioner for secondary or tertiary care).[15] ‡p=0·0481.

Table 2: **Baseline characteristics**

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breastfeeding data at 6 weeks and 6 months postnatally were obtained via survey and missing data were imputed as not breastfeeding.

Role of the funding source

The funding source had no role in the study design; collection, analysis, or interpretation of data; writing of the report; or in the decision to submit the paper for publication. SKT, SK, DLH, MBT, BH, and AB had full access to study data; JA, AF, MB, HS, JW, AL, AW, CH, and MF had access to subsets of the data. All authors were responsible for the decision to submit for publication.

Results

6439 publicly insured women were screened at the participating hospitals between Dec 8, 2008, and April 15, 2011. Of the 4691 women excluded, 2205 did not meet the inclusion criteria, 1052 declined to participate, and 1434 were either missed for recruitment by the research midwives or could not be recruited because the caseload group practices were full. Most of the 2205 women who did not meet the inclusion criteria were excluded because they were not in equipoise with respect to their care provider or mode of birth. These women stated a preference at booking, were already booked with a caseload midwife, or requested hospital-based, consultant-led care.

	Caseload group (n=871)	Standard care group (n=877)	Odds ratio (95% CI)	p value
Primary maternal outcomes				
Mode of birth				
Caesarean section	183 (21%)	204 (23%)	0·88 (0·70–1·10)	0·26
Caesarean section with labour	114 (13%)	110 (13%)	1·05 (0·79–1·39)	0·73
Caesarean section with no labour (elective)	69 (8%)	94 (11%)	0·72 (0·52–0·99)	0·05
Instrumental birth	172 (20%)	171 (19%)	1·02 (0·80–1·29)	0·90
Unassisted vaginal	487 (56%)	454 (52%)	1·18 (0·98–1·43)	0·08
Missing data	29 (3%)	48 (5%)	0·60 (0·37–0·95)	0·03
Analgesia for labour				
Epidural in labour	314 (36%)	304 (35%)	1·06 (0·87–1·29)	0·54
No pharmacological analgesia	216 (25%)	140 (16%)	1·74 (1·37–2·20)	<0·0001
Primary infant outcomes				
Apgar score at 5 min ≤7	38 (4%)	36 (4%)	1·07 (0·67–1·70)	0·79
Admitted to NICU or SCN	95 (11%)	108 (12·3)	0·87 (0·65–1·17)	0·36
Born preterm (<37 weeks)	39 (4%)	51 (6%)	0·76 (0·49–1·16)	0·21
Secondary outcomes				
Antenatal inpatient admissions	103 (12%)	101 (12%)	1·03 (0·77–1·38)	0·84
Median number of antenatal visits	10 (8–12)	11 (8–12)	Median difference* 1·0 (0·03–1·96)	0·05
Labour onset				
Spontaneous	367 (42%)	311 (35%)	1·33 (1·09 –1·61)	0·005
Induction	208 (24%)	249 (28%)	0·79 (0·64–0·98)	0·05
Augmentation (after 4 cm dilatation)	215 (25%)	180 (21%)	1·27 (1·01–1·59)	0·05
Missing data	81 (9%)	137 (15%)	0·50 (0·41–0·74)	<0·0001
Breastfeeding				
On hospital discharge	776 (89%)	747 (85%)	1·42 (1·07–1·89)	0·01
Breastfeeding at 6 weeks†	509 (58%)	388 (44%)	1·77 (1·47–2·14)	<0·0001
Breastfeeding at 6 months†	396 (45%)	279 (32%)	1·79 (1·47–2·17)	<0·0001
Postpartum blood loss				
<500 mL	671 (77%)	623 (71%)	1·37 (1·10–1·70)	0·0043
500–1000 mL	121 (14%)	125 (14%)	1·03 (0·79–1·35)	0·83
>1000 mL	28 (3%)	43 (5%)	0·64 (0·40–1·05)	0·07
Missing data	51 (6%)	86 (10%)	0·57 (0·40–0·82)	0·002
Postnatal stay 0–2 days	314 (39%)	228 (29%)	1·53 (1·24–1·88)	0·0001
Median postnatal stay	2·5 (1·5–3·5)	2·9 (1·9–3·9)	Median difference* 0·38 days (0·18–0·56)	0·0001

Data are n (%) or median (IQR), unless otherwise indicated. NICU=neonatal intensive care unit. SCN=special care nursery. *Median regression with bootstrap estimates for the CI. †Non-responders were imputed as not breastfeeding, so percentage calculations are based on total pregnancies in each study group rather than the numbers who responded to the surveys at 6 weeks and 6 months.

Table 3: Primary and secondary maternal and infant outcomes

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	Caseload group (n=693)	Standard care group (n=679)	p value
Intact	90 (13%)	84 (12%)	0·70
Episiotomy	135 (19%)	146 (22%)	0·35
First or second degree tear	317 (46%)	281 (41%)	0·10
Third or fourth degree tear	26 (4%)	20 (3%)	0·40
Laceration, sutured	38 (5%)	30 (4%)	0·36
Laceration, not sutured	38 (5%)	35 (5%)	0·79

Data are n (%), unless otherwise indicated.

Table 4: Perineal status after vaginal birth

	Caseload group (n=871)	Standard care group (n=877)	p value
Gestational age (completed weeks)			0·088
<37	39 (4%)	51 (6%)	..
37–41	788 (90%)	761 (87%)	..
42–43	12 (1%)	14 (2%)	..
Missing data*	32 (4%)	51 (6%)	..
Birthweight (g)			0·015†
<2500	26 (3%)	31 (4%)	..
2500–4499	774 (89%)	749 (85%)	..
≥4500	23 (3%)	16 (2%)	..
Missing data*	48 (6%)	81 (9%)	..
Fetal loss			
Fetal loss or neonatal death before 24 weeks	11 (1%)	12 (1%)	0·847
Fetal loss or neonatal death at 24 weeks or later	3 (<1%)	3 (<1%)	0·993
Perinatal outcome			0·040
Liveborn, survived	836 (96%)	821 (94%)	..
Liveborn, neonatal death	0	2 (<1%)	..
Stillbirth	3 (<1%)	1 (<1%)	..
Missing data*	32 (4%)	53 (6%)	..

Data are n (%), unless otherwise indicated. *Missing data due to pregnancy loss or loss to follow-up. †When missing data are included, p=0·015.

Table 5: Other infant outcomes

	Parity	Gestation	Birthweight (g)	Cause of death	Post-mortem examination
Caseload group	0	37 weeks, 0 days	2760	Unexplained intrauterine fetal death	Full
Caseload group	0	38 weeks, 2 days	3754	Unexplained antepartum death	Full
Caseload group	2	39 weeks, 6 days	4890	Stillbirth at term	None
Standard care group	2	27 weeks, 0 days	1070	PPROM with cord prolapse	Full
Standard care group	0	24 weeks, 3 days	615	PPROM with chorioamnionitis	None
Standard care group	0	41 weeks, 3 days	3445	Acute chorioamnionitis	None

PPROM=preterm premature rupture of membranes.

Table 6: Adverse outcomes in individual infants older than 24 weeks' gestational age, by trial group

1748 women were recruited to the study; 871 were allocated to caseload care and 877 to standard care (figure 1). Site 1 contributed 1328 participants to the trial between Dec 8, 2008, and May 31, 2011, and site 2 contributed 420 participants to the trial from June 22, 2010, to May 31, 2011. 19 (2%) women crossed over from caseload to standard care and 65 (7%) crossed over from standard to caseload care. Table 2 shows the baseline characteristics of the study population, of whom 1224 (70%) were first-time mothers. Body-mass index differed between the groups, but the difference was judged not to be clinically significant (table 2).

During the study, 759 (87%) women in the caseload group had their known caseload midwife or their backup caseload midwife with them in labour, compared with only 123 (14%) women in the standard care group who had met their midwife before going into labour.

The proportion of caesarean sections did not differ between the groups (table 3). The overall proportion of women who had caesarean sections in the study population fell by more than 20% from the pretrial rate at site 1 used to calculate the numbers needed to study (the pretrial rate at site 2 was higher than at site 1, but was not taken into consideration for this calculation). Women in the caseload group were significantly less likely to have an elective caesarean section (before onset of labour) than were women in the standard care group (table 3).

Proportions of instrumental births and unassisted vaginal births were similar, as were the proportions of women given epidural analgesia during labour (table 3). Significantly more women in the caseload than in the standard care group had no pharmacological analgesia (table 3).

Similar numbers of babies had an Apgar score of 7 or less at 5 min in the two groups (table 3). There were no differences between the numbers of babies born preterm and those admitted to a special care nursery or neonatal intensive care unit (table 3).

With respect to the secondary outcomes, women in the caseload group were significantly more likely to have a spontaneous onset of labour, less likely to have their labour induced, and more likely to have augmentation of labour than those in the standard care group (table 3). Proportions of antenatal hospital admissions did not differ between the groups, but women in the caseload group had a median of one fewer antenatal visit than those in the standard care group (table 3). Women in the caseload group were significantly more likely than those in the control group to have a birth-related blood loss of less than 500 mL, although the likelihood of having severe blood loss (>1000 mL) did not differ significantly between the groups (table 3). Women in the caseload group were significantly more likely to be discharged from hospital within 2 days of birth and had shorter median postnatal stays than did controls (table 3).

For the other secondary outcomes, perineal status after vaginal birth was similar between the caseload and

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	Caseload group (n=871)		Standard care group (n=877)		Median difference (95% CI)*	p value
	Mean	Median (IQR)	Mean	Median (IQR)		
Unassisted vaginal birth	3874·03	3254·66 (1977·32–4929·30)	4837·13	4087·77 (2515·08–6917·96)	833·11 (459·28 to 1206·94)	<0·0001
Instrumental birth	6571·35	6100·66 (4291·09–8063·46)	5931·37	5927·32 (4182·84–7522·60)	−167·87 (−1048·30 to 712·56)	0·71
Caesarean section	8905·81	7559·21 (5817·80–9828·06)	8054·04	7567·53 (5699·66–9539·92)	19·23 (−675·92 to 714·38)	0·96
All births	5497·34	4628·27 (2698·89–7164·96)	5903·67	5195·40 (3220·39–7541·55)	566·74 (106·17 to 1027·30)	0·02

*Median regression with bootstrap estimates for the CI.

Table 7: Hospital cost (AUS$), by mode of birth

standard care groups (table 4). Other infant outcomes (birthweight and gestational age at birth) were also much the same (table 5), and both groups had a perinatal mortality rate of less than 1% (tables 5, 6). No maternal deaths occurred during the trial.

Caseload midwifery care for unassisted vaginal birth cost significantly less than standard maternity care. This difference contributed to a significant difference in the overall median cost of birth per woman of AUS$566·74 (95% CI 106·17–1027·30; p=0·02; table 7). However, the cost data showed several high-cost outliers greater than $30 000 (figure 2), which were due to serious medical disorders, surgical complications, or accidental causes. The largest outlier, which cost more than $40 000, was due to a motor vehicle accident.

A higher proportion of babies from the caseload group than from the standard care group were breastfeeding at hospital discharge (table 3). 1007 women (58%) responded to the 6-week breastfeeding survey (567 [65%] from the caseload group and 440 [50%] from the standard care group). When non-responders were imputed as not breastfeeding, babies were significantly more likely to be breastfeeding at 6 weeks if their mothers had been in the caseload group rather than the standard care group (table 3). When we re-examined the data to include only those who responded to the 6-week survey, 90% (509/567) of the women in the caseload group and 88% (388/440) of those in the control group were breastfeeding at 6 weeks (p=0·42).

944 women (54%) responded to the 6-month breast-feeding survey (546 [63%] from the caseload group and 398 [45%] from the standard care group). When non-responders were imputed as not breastfeeding, babies were significantly more likely to be breastfeeding at 6 months if their mothers had been in the caseload group rather than the standard care group (table 3). When we re-examined the data to include only those who responded to the 6-month survey, 73% (396/546) of the women in the caseload group and 70% (279/398) of those in the control group were breastfeeding at 6 months (p=0·41).
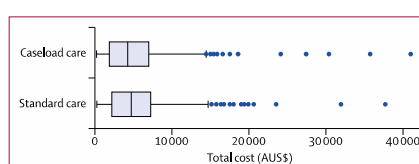

Figure 2: Box plot for the range of costs
Boxes show the distribution of costs with median, IQR, and the lower and upper adjacent values, with the outliers plotted as individual points.

Discussion

We have shown in a randomised controlled trial that provision of caseload care to women irrespective of risk status in a tertiary hospital setting is both feasible and cost effective. We showed no differences between case-load midwifery and standard maternity care in any of the primary clinical outcomes (number of caesarean sections, instrumental vaginal births, unassisted vaginal births, and use of epidural analgesia during labour). However, we noted a significant difference with respect to the overall median cost of birth per woman in favour of caseload midwifery care. Neonatal outcomes—Apgar scores of 7 or less at 5 min, admission to a special care nursery or neonatal intensive care unit, and preterm birth—did not differ significantly between the groups. Fewer women in the caseload group than in the control group had a caesarean section without labour (elective caesarean section), although the significance was border-line and this finding is not very robust because it is only one of several outcomes tested.

Limitations of the M@NGO trial relate to the number of crossovers, the non-masking of group allocation from clinicians, and the randomised trial context. During the study, 84 women crossed over and did not receive their assigned model of care, 43 moved out of the area, and a further 41 were lost to follow-up. Taken together, these women represented less than 10% of the study population, and crossover was biased in favour of women crossing to the intervention group (n=65) rather than from the intervention group to the control group (n=19). At both research sites the caseload model of care was

available to women not included in the study, which, combined with availability of research evidence and hospital information about the caseload model, might have promoted crossover from standard to caseload care. However, this explanation does not account for crossovers from caseload to standard care.

External validity is not guaranteed by a randomised design, since it depends on the extent to which the trial population is representative of the general population (in this case of pregnant women). In other settings, with participants from different linguistic or socioeconomic groups, or with less infrastructure and fewer well trained, motivated professionals than in our two centres, the results could have been be different. The settings for this study—integrated maternity services in busy tertiary hospitals with high rates of caesarean section—will, as Turnbull and colleagues[18] reported in 1996, inevitably have affected practice and therefore the results. The fact that provision of similar programmes in other settings could yield different results should be kept in mind if these findings are applied elsewhere.

An important finding was the overall decrease in caesarean sections for both groups from the pretrial proportion of 29% (at site 1) to 22% in the study population. This decrease could be seen as a limitation of the trial and the result of the Hawthorn effect. Alternatively, the restructuring of midwifery care to caseload midwifery might have positively affected clinical practice in the standard care model, particularly within

the birth environment at site 1. Nevertheless, the decrease in caesarean sections represents a more than 25% reduction compared with Australian national data.[1]

Small differences in most clinical outcome measures in favour of caseload midwifery together might account for the lower median cost for caseload midwifery than for standard care. The difference in the median cost of unassisted vaginal birth in favour of caseload care and the fact that 33 more women in the caseload group than in the standard care group had an unassisted vaginal birth accounts for a sizeable saving from caseload care. Higher proportions of women with spontaneous onset of labour, less use of pharmacological analgesia for labour, and fewer women having a postpartum blood loss greater than 500 mL, combined with one fewer antenatal visit and a significant reduction in median length of stay in the postnatal ward by roughly 8 h (0·38 days) for women in the caseload group are the most likely differences to have led to the AUS$566·74 reduction in cost per woman for caseload midwifery.

The reduced postpartum blood loss in the caseload group is noteworthy in view of the increasing incidence of postpartum haemorrhage in high-income countries, which is still a major cause of maternal morbidity and mortality.[19] Women in the caseload group also seemed to have improved breastfeeding rates at hospital discharge and at 6 weeks and 6 months postnatally (when non-responders were imputed as not breastfeeding in the intention-to-treat analysis; table 3). Such an improvement could have a substantial public health benefit, since breastfed infants are less likely to have gastrointestinal and respiratory infections, otitis media, eczema, asthma, and allergic sensitisation,[20–22] and are less likely to be obese during childhood.[23] However, when only survey responders were considered at 6 weeks and 6 months, no difference between the groups was seen. The limitation of this finding is therefore that the difference between groups might better reflect the rate of response to the survey question than differences in breastfeeding rates at both time intervals.

The eligibility criteria for our study excluded women who expressed a preference for caseload midwifery. At site 1 (where 76% of participants were enrolled), 40% of women giving birth at the hospital had access to caseload midwifery as an option, as did 18% of women at site 2. Many women having a second or subsequent baby chose caseload midwifery, leaving a higher than normal proportion of primiparous women without a preference and therefore eligible to be randomly assigned. As a result, 70% of women in the study were primiparous, compared with 41·6% of pregnant women in the national population in 2009.[1] With the more than two-times increase in the likelihood of women who are having their first child undergoing an elective caesarean section in Australia between 1984–88 and 1999–2003,[24] that the first-time expectant mothers in our trial population had fewer caesarean sections than the general Australian population

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is an important finding. Furthermore, mothers older than 35 years were overrepresented in our study (27% *vs* 23% in the Australian national population);[1] older maternal age is usually associated with increased rates of caesarean section.[24]

Caseload midwifery care is a complex intervention that consists of multifaceted components that can act independently and interdependently. These complex networks of components can have powerful and pervasive effects on how systems actually perform and function.[25,26] Performance and function are affected by factors such as enhanced senior management support, clear governance structures and communication, clinical engagement, and give and take between professionals.[27] These were all elements of the reorganisation process at the two hospitals in our study.[16]

The configuration of the caseload model differs substantially from standard midwifery care (table 1). Caseload midwifery care seems to work in the maternity system by intervening in and changing some of the pathways that can contribute to increased obstetric intervention. It works on the assumption that women will labour more effectively, need to stay in hospital less time, and feel a stronger sense of satisfaction and personal control if they have the opportunity to get to know their midwife[28,29] in a partnership relationship,[30,31] rather than rely on unfamiliar hospital staff during their maternity care. Because of the systemic inter-relatedness, the relationships between caregivers and women in the caseload model probably affected the system as a whole at the hospitals in the study.

The provision of continuity of carer is difficult to achieve in maternity services in which most midwives have become accustomed to working shifts, and in which midwifery and birth have become institutionalised.[28,29] In this study, the large majority of women in the caseload group had their known caseload or backup caseload midwife with them in labour, compared with only a small proportion in the standard care group who had met their midwife before going into labour.

In summary, our findings showed no significant difference in the proportion of women who had caesarean sections between caseload and standard care for women of any risk. Caseload midwifery care seemed to cost less than standard care, with similar clinical outcomes (panel). Since maternity is one of the most common reasons for hospital admission in Australia and other countries, a cost reduction from a reorganisation of the way in which care is delivered in the public hospital system could play a major part in reducing public health expenditure.

Contributors

This study was designed by the investigators, with SKT taking the lead role. MBT analysed the clinical data. MBT, SKT, BH, DLH, and SK analysed the economic data, with advice from the hospital performance branches at both sites. All investigators contributed to the interpretation of the data. SKT prepared and modified the report, with all authors contributing to and commenting on drafts. The final version was approved by all authors.

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Appendix 11: Mobile technologies publication Women and Birth

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Mobile technologies and communication strategies in an urban Midwifery Group Practice setting. An exploratory study

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ABSTRACT

Background: Around-the-clock access to a known midwife is a distinct feature of Midwifery Group Practice (MGP) and caseload midwifery settings; although the literature suggests this aspect of working life may hinder recruitment and retention to this model of care. Mobile technologies, known as mHealth where they are used in health care, facilitate access and hence communication, however little is known about this area of midwifery practice.
Research question: Which communication modalities are used, and most frequently, by MGP midwives and clients?
Methods: A prospective, cross sectional design included a purposive sample of MGP midwives from an Australian tertiary maternity hospital. Data on modes of midwife–client contact were collected 24 h/day, for two consecutive weeks, and included: visits, phone-calls, texts and emails. Demographic data were also collected.
Findings: Details about 1442 midwife–client contacts were obtained. The majority of contact was via text, between the hours of 07:00 and 14:59, with primiparous women, when the primary midwife was on-call. An average of 96 contacts per fortnight occurred.
Conclusion: The majority of contact was between the midwife and their primary clients, reiterating a key tenet of caseload models and confirming mobile technologies as a significant and evolving aspect of practice. The pattern of contact within social (or daytime) hours is reassuring for midwives considering caseload midwifery, who are concerned about the on-call burden. The use of text as the preferred communication modality raises issues regarding data security and retrieval, accountability, confidentiality and text management during off-duty periods. The development of Australian-wide guidelines to inform local policies and best practice is recommended.

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1. Introduction

Midwifery Group Practices (MGPs), providing caseload care, are increasingly common in Australian maternity settings. Around-the-clock (24/7) access to a named midwife, or known back-up midwife is a unique feature of this model of care; on-demand access is linked to maternal satisfaction.[1] The use of mobile technologies to facilitate communication between midwives and their clients is now well established in MGP models, although there are implications regarding confidentiality and accountability.[2] This study explored mode and frequency of contact between MGP midwives and clients and hence, aimed to provide insight into this under-reported aspect of practice.

2. Literature review

2.1. Mobile technologies in health care

Worldwide expansion in the use of mobile technologies (also known as m-Health or telemedicine) has allowed rapid and increased access to health care, especially for socially and geographically isolated populations.[3,4] Text messaging may be used to target particular groups such as young people, or to

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communicate information about sensitive issues including sexual health.[5] Young women have been identified as a high-user group,[6,7] with young mothers in particular targeted with contraception, pregnancy, and childbirth-related information.[8] It is not known, however, if exposure to health messages results in greater engagement.[9]

In Australia, m-Health research within maternity contexts has mainly focused on health promotion or access to treatment for Aboriginal and Torres Strait Islander women living in rural and remote regions of Australia.[10] Internationally, mobile technologies have been identified as vital in the achievement of Millennium Development Goals aimed at improving maternal and infant health outcomes,[11,12] especially in developing countries.[13,14]

Women receiving MGP care report having 24/7 telephone access to midwives as popular[15] and reassuring,[16] although negative aspects include unwanted impact on midwives' personal lives.[17] Phone use in MGP settings differs from standard maternity care where texts may be more likely to be used for appointment reminders or to provide information.[18] The potential for clinical consultations in MGP settings is a unique feature of practice although aspects of care relating to confidentiality, documentation and accountability raise medico legal issues.[19]

Much of the mHealth literature in nursing and midwifery is in the form of policy and educational documents. The New Zealand Midwifery Council code of conduct contains regulatory advice for texting,[20] and the United Kingdom (UK) Nursing and Midwifery Council lists the 'ability to text' as an essential communication skill for midwifery registration.[21] The UK Royal College of Nursing (RCN) report[2] on best practice for text messaging recommends guidelines and policies include; standardisation of advice, user involvement, potential impact on vulnerable groups, education and training of staff, documentation and informed consent from clients, regular review, and monitoring. Consideration of information disposal, costs (client and provider), equipment access and maintenance, and workload implications were also recommended and internet-linked text facilities were suggested. The RCN[22] also released practitioner guidelines emphasising the need for safe and appropriate use of mobile phones by staff working with children and young people. A search of key words in policy and governance documents from the Australian College of Midwives (ACM) and the Australian Health Practitioner Regulation Agency (AHPRA) made no reference to 'SMS', 'texting' or 'mobile phone'. Furthermore, the authors are not aware of any Australian educational facilities which include the use of mobile technologies in midwifery education curricula.

3. Methods

3.1. Design

A prospective cross-sectional design which included a purposive sample of MGP midwives working in an Australian tertiary maternity hospital.

3.2. Setting

The hospital provides maternity care for approximately 5000 publicly-funded women annually. The MGP model, (which commenced in 2006), is available to approximately 17% of women who access the service via routine GP referral. At the time of the study all MGPs ($n = 5$) employed the same number of midwives ($n = 4$) and were located in five discrete locations across the hospital catchment area; one MGP provided care specifically for young women. All MGP midwives work full-time, caring for 40 clients over a 12 month period. A midwife's caseload contains

approximately 50% of multiparous and primiparous women and the period of maternity care extends from the booking visit until 4–6 weeks postpartum. When midwives are on-call (on-duty) phone calls and texts are sent and received 24/7; institutional requirements stipulate that off-duty staff divert calls to practice partners and switch phones off (thus preventing receipt of texts, as well as calls). Human Research Ethics approval (Ref No. 1718QA) was granted.

3.3. Participants

All MGP midwives ($n = 20$) were invited to participate in the study. Fifteen agreed, representing each of the five geographical locations.

3.4. Recruitment

Study information was provided via in-service education sessions, which outlined conditions of participation; information sheets, containing the researcher's contact details, were also disseminated. Written consent was obtained immediately prior to participation.

3.5. Data collection

A purpose-designed data collection tool was piloted to assess feasibility and acceptability; no modifications were required. The tool was used to gather information on the number and type of contacts between midwives and their clients over a 24/7 period, for ten consecutive days, within a two week time-frame. Participants contributed to the tool design, and the manner in which it might be used most effectively; agreed the timeframe would accommodate normal peaks and troughs in client activity.

The following contact-related information was sought: mode (visit, phone, text, email), time of day, duration (in minutes), on-call or off-duty, planned or unplanned, and whether the primary or back-up midwife was contacted. Demographic data from women included parity, age (21 and under), gestation (weeks), and postnatal (days). Demographic data from midwives included years of midwifery experience (including MGP), and type of training (university/hospital). The tool contained a legend of category definitions to assist participants with recording client contacts as accurately as possible.

3.6. Data analysis

All data were de-identified before analysis commenced. Simple descriptive statistical analysis was undertaken using Microsoft Office Excel (2010) and SPSS (Version 15.0 for Windows). An SPSS file was created to accommodate the predefined variables. Data were cleaned and tested for normality and missing or incorrect data rectified. All variables were analysed to determine frequencies, and comparisons of all variables were analysed for significance. Where data were not normally distributed, non-parametric tests including Chi-square and Mann-Whitney, were used. Significance was set at 0.05. Phone calls refer to mobile phones as the midwives typically use landlines when in the hospital and for administrative purposes, but not for client contact. Some variables were categorised into sub-groups to assist analysis (e.g. gestation was grouped into time periods which correlated to pregnancy milestones). The postnatal period was grouped into (six) weekly cycles. Time of day was divided into three periods approximating hospital shifts: day (07:00–14:59), afternoon/evening (15:00–23:59), night (00:00–06:59). Although MGP midwives do not work a shift pattern, these time frames reflect normal working hours of hospital-based midwives in the tertiary setting

under study, thus providing a real-time context to compare communication patterns.

The data collection tools were well completed with very little missing data although the time required for text communication, which was requested, was often omitted. After discussion with participants, the authors agreed to assign two minutes per text message in the instance of missing data ($n = 107$). Data collection was not intended to include midwife–client contact in labour although some participants recorded this as a 'visit'. Hence, any visits exceeding 2 h were deemed likely to be labour contact and were excluded. Although email contact was included in the data collection tool, as only one such contact was recorded, it was excluded from analysis. The mobile phones currently issued to participants have limited data capability (no internet access) but are capable of diverting incoming calls.

4. Results

Of the eligible midwives ($n = 20$), 75% ($n = 15$) participated in the study. All MGP locations ($n = 5$) were represented and a total of 1442 midwife–client contacts were collected. An average of 96 contacts per midwife, per fortnight, occurred. The majority of participants trained in the UK (53%, $n = 8$) and were university graduates (73%, $n = 11$). On average, midwives had been qualified for 13 years (mean), and had practised in the current MGP for less than 2 years (mean). None of the participants had worked in an MGP at another hospital.

The majority of contact was during day-time hours and was between the woman and her primary midwife. Approximately half of all contacts were planned and most occurred when the midwife was on call. The majority of contacts were likely to be with primiparous women. Across the maternity care episode, midwife–client contact via text was marginally higher than via phone or visit (Table 1). Phone was the most common mode of antenatal contact (39.5%); while text was the most frequently used method in the postnatal period (41.1%, $p < 0.001$). Contact with the primary midwife was significantly higher in the postnatal period compared to the antenatal period (82.4% vs. 73.2% <0.001).

Most antenatal contact with primiparous women occurred between 37 and 40 weeks and with multiparous women between 29 and 36 weeks, and the majority of contact from 41 to 42 weeks was with multiparous women. Most contact between a client and her primary midwife occurred between 37 and 40 weeks, compared with the back-up midwife who was more likely to be contacted between 29 and 36 weeks ($p < 0.001$) (Table 2). Most antenatal contact occurred during the daytime and occurred between 29 and 36 weeks gestation (20.3%). Overnight midwife–client contact increased over the gestation, with most occurring between 37 and 40 weeks (2.7%, $p < 0.001$).

Table 1
Midwife–client contacts per fortnight.

	n (%)
Time of day contact	
07:00–14:59	1027 (72.0%)
15:00–23:59	335 (23.8%)
00:00–06:59	48 (3.4%)
Allocated Midwife status	
Primary Midwife	1085 (76.8%)
Backup Midwife	328 (23.2%)
Planned and unplanned	
Planned	695 (51.9%)
Unplanned	644 (48.1%)
Midwife's on call status	
On call	1333 (92.8%)
Day off	103 (7.2%)
Client parity	
Primiparous	947 (68.3%)
Multiparous	440 (31.7%)
Mode of contact	
Visit	421 (29.2%)
Phone	484 (33.6%)
Text	537 (37.2%)
Antenatal and postnatal	
Antenatal	818 (59.2%)
Postnatal	564 (40.8%)

Contact during daytime hours was less likely antenatally than postnatally. The majority of night-time contact was via phone; however this was rare, amounting to only 2.4% of all modes and time of day contact. All contacts were significantly more likely to occur when the midwife was on call ($p < 0.001$). The greatest volume of off-duty contact occurred antenatally and was via text (Fig. 1).

Contact which was planned and unplanned was fairly evenly distributed. Significant differences were found however, in mode of planned and unplanned contact, where visits were mostly planned, and phone and text were mostly unplanned ($p < 0.001$). Regardless of mode, contact during the day-time was mostly planned compared to afternoon/evening and overnight contact, which was generally unplanned ($p < 0.001$) (Fig. 2). Planned and unplanned contact changed trajectory over the antenatal period where at 0–12 weeks gestation, the majority of client contact was planned (61.0%) and by term (37–40 weeks) the majority of contact was unplanned (58.0%, $p < 0.001$). Antenatal contact (54.5%) was more likely to be unplanned, compared to postnatal contact (62.5%) which was mostly planned ($p < 0.001$).

In this study, midwife 'on-call' status, planned and unplanned contact, time-of-day, client gestation and days postnatal, were all found to influence mode of contact, however client age and parity did not.

Table 2
Point of care midwife–client contact by parity and midwife type.

Gestation	Primipara	Multipara	p value	Primary Midwife	Backup Midwife	p value
	n (%)	n (%)		n (%)	n (%)	
0–12	30 (5.8%)	35 (12.4%)	0.00	60 10%)	10 (4.6%)	0.00
13–20	70 (13.6)	46 (16.3%)		103 (17.3%)	13 (5.9%)	
21–28	87 (17%)	37 (13.1%)		97 (16.3%)	33 (15.1%)	
29–36	126 (24.6%)	88 (31.2%)		140 (23.5%)	83 (37.9%)	
37–40	167 (32.6%)	45 (16%)		152 (25.5%)	59 (26.9%)	
41–42	33 (6.4%)	31 (11%)		44 (7.4%)	21 (9.6%)	
Total	513 (100%)	282 (100%)		596 (100%)	219 (100%)	

Postnatal contact by parity ($p < 0.063$) and primary midwife status ($p < 0.598$) was not significant.
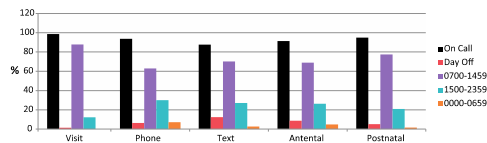
Fig. 1. Antenatal and postnatal contact mode, timing and on-call status.

5. Discussion

This study supports accepted MGP practice,[23] confirming that the majority of contact (76.8%) was between the midwife and their primary clients. Contact with primiparous women antenatally (56.2%), compared with postnatally (43.8%) remained fairly consistent, especially in comparison with multiparous women where postnatal contact was less (34.9%), compared to antenatally (65.1%). This perhaps indicates the additional support first time mothers require in the postnatal period. The majority of contact from 41 to 42 weeks gestation being with multiparous women is an interesting finding potentially indicating that by this gestation the primiparous women may have already birthed. The majority of contact in the postnatal period was planned (62.5%) suggesting that this was midwife–initiated, and possibly primarily concerned with arranging appointments. The potential for client contact during unsocial hours is a feature of MGP models, and has been linked to midwife dissatisfaction,[17,24] although our study found otherwise, with the majority of contact occurring during on call, and daytime, hours.

The use of text messaging by midwives and clients mirrors the expansion and capabilities in mobile technologies more generally, as it is often quicker, easier, and cheaper.[25] However, where texting practices are integral to clinical care, as with MGPs, issues arise regarding client confidentiality, accountability for the receipt and interpretation of text content, and the facility for accurate documentation. The potential use of texts for clinical consultation requires further investigation, as recently highlighted in a coronial inquiry into the death of a newborn, where the midwife was criticised for text-messaging her client as it *"prevented adequate clinical assessment"*.[26] Anecdotal commentary from participants revealed a commonly held belief that young women use text messaging to contact their midwives more often than older women, although this was not supported by study findings.

Participants in this study are required by their employer to divert their phones to their practice partners when off-duty or on leave. This did not always occur, however, with some participants reporting that they continued to receive text messages (12.4%) and phone calls (6.4%), although face-to-face contact was rarely reported (1.4%). Whilst off-duty contact was limited, it is nonetheless of significance, highlighting practice discrepancies among midwives, and contradictions with employer expectations.
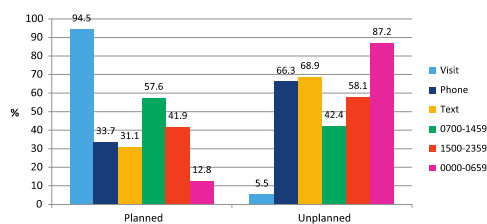

Fig. 2. Mode and timing of planned and unplanned contact.

This may be at least partly explained by the fact that texts which are received by the 'off-duty' midwife must be managed, compromising time away from work. This aspect of practice requires further research.

The variety and acceptability of ever-evolving text language, together with the influence of user age and gender,[6] personality traits,[27] and variations in health literacy,[28] all require careful consideration in health settings. Best practice guidelines are urgently needed for Australian maternity settings; any such guidelines will require continual revision to reflect local circumstances.[29] Research which explores the content of text messages, and actions taken by MGP midwives would usefully inform policy and practice guidelines.

6. Limitations

These findings have been generated in the context of a particular maternity setting; however we suggest that MGPs operate in similar ways, with midwives using mobile technologies as their preferred mode of client contact. Findings are therefore likely to be transferable.

Face-to-face contact with clients in labour was not included in this study as the intention was to explore modes of routine communication between midwives and clients, rather than the circumstances of care provided. The total number, and timing, of this type of contact was therefore under-represented although other labour-related contact including texts and phone calls, were included. The accuracy of collected data was reliant on midwives self-recording and hence, over or under-estimation of time, and other aspects under study, may have occurred. The two minute allocation for texting may have also have over, or under, estimated the actual time taken, as texting is dependent on the complexity and length of the text involved and the dexterity of the operator.[27]

Although each client episode was recorded separately, the identity of individual clients was not recorded, and thus it was not possible to determine if contact was with the same, or different, clients on each occasion. In the absence of access to transcripts of text message content it was also not possible to assess whether communication with clients was used for administrative, information, or consultation purposes; this requires further research.

7. Conclusion

This study confirms mobile technologies as a significant and evolving aspect of midwifery practice, particularly in MGP settings. The majority of client contact was with the primary midwife, reiterating a key tenet of this model. The pattern of client contact within social hours is reassuring for midwives considering employment in caseload midwifery. The use of text as a communication strategy raises issues regarding data security and retrieval, accountability, and confidentiality, as well as client contact in off-duty periods. The absence of Australian Guidelines for texting in midwifery practice is problematic and although the issue is being addressed within the study hospital, it highlights a need for further research.

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