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National core maternity indicators–stage 2 report

2007–2011

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National Core Maternity Indicators Stage 2 report

2007–2011

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- Dr Fadwa Al-Yaman (AIHW) (Chair)
- Ms Suzanne Cornes (Queensland Health, Chair of the National Perinatal Data Development Committee)
- Professor David Ellwood (Griffith University)
- Professor Caroline Homer (University of Technology)
- Dr Janet Hornbuckle (King Edward Memorial Hospital, Western Australia)
- Professor Michael Humphrey (Office of Rural and Remote Health, Chair of the Queensland Maternal and Perinatal Quality Council)
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- Professor Elizabeth Sullivan (formerly from AIHW NPESU).

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Abbreviations

ACHI	Australian Classification of Health Interventions
ACHS	Australian Council on Healthcare Standards
ACS	Australian Coding Standards
ACSQHC	Australian Commission on Safety and Quality in Health Care
AIHW	Australian Institute of Health and Welfare
BFHI	Baby-Friendly Hospital Initiative
CDRG	Clinical Data Reference Group
ECG	Expert Commentary Group
ICD-10-AM	International statistical classification of diseases and related health problems, 10th revision, Australian modification
mL	millilitre
METeOR	Metadata Online Registry (AIHW)
MSIJC	Maternity Services Inter-Jurisdictional Committee
NCMI	National Core Maternity Indicators
NHMD	National Hospital Morbidity Database
NICN	neonatal intensive care nursery
NICU	neonatal intensive care unit
NMDDP	National Maternity Data Development Project
NMDDPAG	National Maternity Data Development Project Advisory Group
NMDS	National Minimum Data Set
NPDC	National Perinatal Data Collection
NPDDC	National Perinatal Data Development Committee
NPESU	National Perinatal Epidemiology and Statistics Unit
PPH	postpartum haemorrhage
SCN	special care nursery
SLA	Statistical Local Area
WHA	Women's Health Australasia

Summary

This report builds on previous work undertaken by the AIHW for the Maternity Services Inter-Jurisdictional Committee (MSIJC) of the Australian Health Ministers' Advisory Council (AHMAC) on the development of a set of National Core Maternity Indicators (NCMIs) to monitor the quality of maternity care in Australia.

This report represents the second stage of the project, which was undertaken by the AIHW during 2012–13. It involved exploring the validity and feasibility of a possible 8 additional NCMIs to be added to the current set of 10 NCMIs. Clinical advice and input was provided by an Expert Commentary Group (ECG).

In consultation with key stakeholders and experts, definitions and technical specifications were developed for the 8 additional NCMIs, and existing and potential data sources for reporting were investigated. Recommendations for next steps were then made for each proposed NCMI.

The 8 potential additional indicators developed and investigated were:

- High risk women undergoing caesarean section who receive appropriate pharmacological thromboprophylaxis (Indicator 11)
- Babies born at or after 37 completed weeks gestation admitted to a neonatal intensive care nursery or special care nursery for reasons other than congenital anomaly (Indicator 12)
- Third and fourth degree tears for (a) all first births and (b) all births (Indicator 13)
- Blood loss of (i) greater than 1,000 mL and less than 1,500 mL, and (ii) 1,500 mL or more during first 24 hours after the birth of the baby (that is, major primary postpartum haemorrhage) for (a) vaginal births and (b) caesarean sections (Indicator 14)
- Women having their second birth vaginally whose first birth was by caesarean section (Indicator 15)
- Separation of baby from the mother after birth for additional care (Indicator 16)
- One-to-one care in labour (Indicator 17)
- Caesarean sections at less than 39 completed weeks gestation (273 days) without obstetric/medical indication (Indicator 18).

During consideration of Indicator 16, the ECG proposed an additional new indicator for further investigation, 'Skin-to-skin contact between mother and baby after birth'.

Recommendations

- Indicators 13, 15 and 18 should be added to the current set of 10 NCMIs for reporting using the National Perinatal Data Collection.
- Indicator 14 to be: aligned with items on postpartum haemorrhage in the 2014–15 Perinatal Data Set Specification (lower limit now to include 1,000 mL blood loss and be reflected in the Indicator title); and added to the current set of 10 NCMIs for reporting.
- Indicator 12 and the ECG-suggested indicator 'Skin-to-skin contact between mother and baby after birth' require further data development, and this development should be undertaken to enable future reporting against these 2 indicators.
- Indicators 11, 16 and 17 should not be further developed or added to the current set of NCMIs at this stage.

1 Introduction

This report extends the work undertaken by the Australian Institute of Health Welfare (AIHW) on the first 10 National Core Maternity Indicators (NCMIs) (AIHW NPESU & AIHW 2013) to scope, develop, agree definitions and assess the feasibility of implementing and reporting for a further 8 indicators.

The National Core Maternity Indicators are clinical indicators that apply to the field of maternity care. A clinical indicator is defined as a measure of the clinical management and outcome of care, and should be based on evidence that confirms the underlying causal relationship between a particular process or intervention and health outcome (WHA 2007). Clinical indicators have a key role in the assessment, monitoring and evaluation of patient care. Most importantly, they allow for monitoring change in practice and outcomes of individual and peer organisations over time, with the objective of improving patient care (AIHW NPESU & AIHW 2013). In Australia many jurisdictions and professional organisations report on maternity services using clinical or performance indicators (see AIHW NPESU & AIHW 2013 for a summary of these maternity-related indicators).

1.1 Background

The foundation for the development of the National Core Maternity Indicators was a recommendation of the Douglas Inquiry into Obstetric and Gynaecology Services provided between 1990 and 2000 at the King Edward Memorial Hospital for Women, Perth. The Inquiry recommended that Australia establish annual benchmarking and/or reporting of performance indicators for obstetric and gynaecological practice and outcomes (KEMH 2001). This led to Australian Health Ministers supporting a 'proof of concept' project that demonstrated the potential to improve the quality of maternity care through benchmarking; and funding by the Australian Council on Safety and Quality in Health Care for a national project to progress development of maternity indicators. The development of a set of national maternity indicators was further progressed by Women's Healthcare Australasia and the Department of Health, Western Australia. In 2008, responsibility for the project was transferred to the Maternity Services Inter-Jurisdictional Committee (MSIJC). The National Maternity Services Plan (AHMC 2011) provides a strategic national framework to guide policy and program development over five years (2011 to 2015), and includes development and implementation of NCMIs as an action item.

1.2 Project objectives

The MSIJC engaged the AIHW to build on previous work undertaken by the MSIJC on the development of a set of NCMIs to monitor the quality of maternity care in Australia. The MSIJC Expert Working Group proposed a set of 20 core maternity indicators. The first 10, for which data are available, formed the basis of a report released earlier this year by the AIHW, National core maternity indicators, based on data from the National Perinatal Data Collection (NPDC). Of the remaining 10 indicators, 2 have been referred to other areas for further work as they form part of their work plans, and work on the other 8 (Indicators 11–18) forms the basis of this report (see Table 1.1). The objectives of the project were in two main parts:

- develop definitions and criteria and assess the feasibility of existing data to support national reporting for indicators 12–15

- explore the plausibility of developing and reporting on indicators 11, 16, 17 and 18 as part of the framework for improving maternity care.

Table 1.1: Current status of NCMIs at commencement of the project

	Indicator	Status
1	Smoking in pregnancy for all women giving birth	Reported in online data portal[(a)]
2	Antenatal care in the first trimester for all women giving birth	Reported in online data portal[(a)]
3	Episiotomy for women having their first baby and giving birth vaginally	Reported in online data portal[(a)]
4	Apgar score of less than 7 at 5 minutes for births at term	Reported in online data portal[(a)]
5	Induction of labour for selected women giving birth for the first time	Reported in online data portal[(a)]
6	Caesarean section for selected women giving birth for the first time	Reported in online data portal[(a)]
7	Non-instrumental vaginal birth for selected women giving birth for the first time	Reported in online data portal[(a)]
8	Instrumental vaginal birth for selected women giving birth for the first time	Reported in online data portal[(a)]
9	General anaesthetic for women giving birth by caesarean section	Reported in online data portal[(a)]
10	Small babies among births at or after 40 weeks gestation	Reported in online data portal[(a)]
11	High risk women undergoing caesarean section who receive appropriate pharmacological thromboprophylaxis	Scoping and developmental work required to agree definitions and identify potential data sources and reporting measures
12	Babies born ≥37completed weeks gestation admitted to a neonatal intensive care nursery or special care nursery for reasons other than congenital anomaly	Development and agreement on definitions, and assessment of the feasibility of standardising existing data for national reporting
13	Third and fourth degree tears for (a) all first births and (b) all births	Development and agreement on definitions, and assessment of the feasibility of standardising existing data for national reporting
14	Blood loss of (i) > 1,000 mL and < 1,500 mL and (ii) ≥ 1,500 mL during first 24 hours after the birth of the baby (i.e. major primary PPH) for (a) vaginal births and (b) caesarean sections	Development and agreement on definitions, and assessment of the feasibility of standardising existing data for national reporting
15	Women having their second birth vaginally whose first birth was by caesarean section	Development and agreement on definitions, and assessment of the feasibility of standardising existing data for national reporting
16	Separation of baby from the mother after birth for additional care	Scoping and developmental work required to agree definitions and identify potential data sources and reporting measures
17	One-to-one care in labour	Scoping and developmental work required to agree definitions and identify potential data sources and reporting measures
18	Caesarean sections <39 completed weeks (273 days) without obstetric/medical indication	Development and agreement on definitions, and assessment of the feasibility of standardising existing data for national reporting
19	Supporting breastfeeding	Referred for further work[(b)]
20	Models of care	Referred for further work[(c)]

(a) NCMI data portal at http://www.aihw.gov.au/ncmi/.

(b) Work on this indicator was referred to the Child Health and Wellbeing Subcommittee.

(c) Work on this indicator will be covered by the National Maternity Data Development Project.

1.3 Project methods and steps

The following steps were undertaken for the development of the indicators:

- literature review to help clarify the rationale for, and evidence to support, each indicator
- review of existing measures and indicator reporting, both national and international, to inform the development of indicator definitions and collection specifications
- development and agreement on associated definitions
- development of technical specifications
- analysis of available data
- assessment of the feasibility of standardising existing data for national reporting
- consultation with members of the Expert Commentary Group and other key experts and stakeholders
- developing and writing this report, including providing recommendations for next steps for each indicator.

Consultation

An Expert Commentary Group (ECG) (see Acknowledgments section) was established to provide clinical advice and input on the development of the NCMIs and on the drafting of this report. The ECG met twice during the course of the project, with members also providing out-of-session input as required.

Further consultation was undertaken in the development of Indicators 11 and 16–18. A survey was circulated to ECG members and other key experts and stakeholders, including clinicians and data managers (see Appendix A for a list of stakeholders consulted). Twenty-three responses were received and were used to inform the development process.

Data sources

Data to inform the development of Indicators 12–15 is available from the AIHW National Perinatal Data Collection (NPDC) and the National Hospital Morbidity Database (NHMD).

The NPDC is a national population-based cross-sectional data collection of pregnancy and childbirth. The data are based on births reported to the perinatal data collection in each state and territory in Australia. Midwives and other staff, using information obtained from mothers and from hospital or other records, complete notification forms for each birth. Selected information is then compiled annually into this national data set by the AIHW National Perinatal Epidemiology and Statistics Unit. Information is included in the NPDC on all babies born at or after 20 weeks gestation or weighing 400 grams or more at birth in hospitals, birth centres, and in the community.

The NHMD is compiled by the AIHW from data supplied by the state and territory health authorities. It is a collection of electronic confidentialised summary records for separations (that is, episodes of care) in public and private hospitals in Australia. Almost all hospitals in Australia are included in the database: public acute and public psychiatric hospitals, private acute and psychiatric hospitals, and private free-standing day hospital facilities.

Hospital records are for 'separations' and not individuals, and as there can be multiple admissions for the same individuals, hospital separation rates do not usually reflect the actual incidence or prevalence of the disease or condition in question.

The collection contains establishment data (information about the hospital), patient demographic data, administrative data, length of stay data, and clinical and related data.

Diagnoses are coded to the *International statistical classification of diseases and related health problems, 10th revision, Australian modification* (ICD-10-AM), which extends the World Health Organization's ICD-10 to provide classifications appropriate for current Australian practice. Procedures are classified using the *Australian Classification of Health Interventions* (ACHI), which includes, but is not restricted to, interventions captured by the Medicare Benefits Schedule. Standardisation of coding using ICD-10-AM and ACHI relies on the use of *Australian Coding Standards* (ACS) by coders in all public and private hospitals in Australia. ICD-10-AM, ACHI and ACS are regularly revised by the Australian Consortium for Classification Development to ensure that they reflect current clinical practice and classifications, and meet the needs of users of inpatient data collections. For the NHMD, the 5th editions of ICD-10-AM/ACHI/ACS were applied to hospital episodes in 2007–08, the 6th editions to episodes in 2008–09 and 2009–10, and the 7th editions to episodes in 2010–11 and 2011–12.

1.4 Related work

Other national maternity data development and definitional work is underway, including the National Maternity Data Development Project (NMDDP), and work being undertaken by the Australian Commission on Safety and Quality in Health Care (the Commission) on a national approach to defining maternal morbidity and postpartum haemorrhage (PPH).

The NMDDP aims to develop a nationally consistent and comprehensive maternal and perinatal data collection in Australia. The AIHW was commissioned by the Department of Health to undertake this project. The project commenced in 2010 in response to actions under the National Maternity Services Plan. Among other things, in its first 2 years, the project has scoped a set of 20 priority maternity data items for data development and inclusion in the NPDC. *Severe primary postpartum haemorrhage* and *Indicators for caesarean section* are 2 of the priority data items. A consistent national definition and a national data standard will be developed for both these items for use in the NPDC, in consultation with clinicians and data managers across Australia. The objective is for these data standards to be included in the Perinatal National Minimum Data Set, which requires agreement by all states and territories to collect it according to the national standard. This will promote national consistency in data collection, recording and reporting.

The Commission has established a Maternal Sentinel Events and PPH Working Group (MSE/PPH Working Group) to investigate issues raised at their Inter-Jurisdictional Committee meeting in relation to the classification of maternal sentinel events and issues surrounding PPH. The MSE/PPH Working Group has recommended that the maternal sentinel event definition be revised and is working on a national approach to defining severe acute maternal morbidity (SAMM) to support local safety review mechanisms. In addition, the group has recommended that PPH data be captured routinely in perinatal data collections according to national health data standards developed as part of the NMDDP. This work is expected to be completed by February 2015.

Alignment of work on the NCMIs with the work of both of these projects is critical to ensure consistent national direction is achieved in national maternity data development.

2 Development of indicators

This project involved the further development of 8 NCMIs. Four indicators required the development of definitions and ways to standardise data for national reporting. The other 4 NCMIs required further scoping and development. During the initial stages of scoping, an additional indicator was proposed by the ECG for further consideration and development, 'Skin-to-skin contact between mother and baby after birth', and is included here.

2.1 Indicators requiring development of definitions and standardisation for national reporting (12–15)

The following 4 indicators required the development of definitions and an assessment of options for standardising the data for national reporting:

- Babies born ≥37 completed weeks gestation admitted to a neonatal intensive care nursery or special care nursery for reasons other than congenital anomaly
- Third and fourth degree tears for (a) all first births and (b) all births
- Blood loss of (i) > 1,000 mL and < 1,500 mL and (ii) ≥ 1,500 mL during first 24 hours after the birth of the baby (i.e. major primary PPH) for (a) vaginal births and (b) caesarean sections
- Women having their second birth vaginally whose first birth was by caesarean section.

In consultation with the ECG, technical specifications were developed for these 4 indicators using a standard set of attributes, including: description, purpose, numerator, denominator, notes and exceptions, data source and data items, and disaggregation levels. These attributes enabled the scope and inclusion/exclusion criteria to be defined. The content of corresponding indicators used by the Australian Council on Healthcare Standards (ACHS) and Women's Health Australasia (WHA) was taken into account. Parameters for analysis of the data were then set, again in consultation with the ECG. Data to support the reporting of these 4 indicators were sourced from the NPDC and NHMD, and analysed to test the validity of the indicator and assess data quality. Results for each indicator are provided below.

2.1.1 Indicator 12: Babies born ≥ 37 completed weeks gestation admitted to a neonatal intensive care nursery or special care nursery for reasons other than congenital anomaly

This indicator was originally proposed by the MSIJC Expert Working Group as 'Inborn term babies transferred/admitted to a neonatal intensive care nursery/unit or special care nursery for reasons other than congenital condition'. Following discussion, the ECG's views were that:

- the purpose of the indicator is to provide a measure of intrapartum morbidity
- the indicator should not be restricted to 'term' births, that is, post-term births should also be captured, and that all births are in scope, including home births and births before arrival to hospital
- the term 'congenital condition' be replaced with 'congenital anomaly'.

The Australian Council on Healthcare Standards (ACHS) already has an indicator for 'All admissions of a term baby to special care nursery or neonatal intensive care nursery'. Following consultation with the MSIJC, they recommended that the existing ACHS indicator definition be used. The following technical specification incorporates this recommendation.

12. Babies born ≥ 37 completed weeks gestation admitted to a neonatal intensive care nursery/unit or special care nursery for reasons other than congenital anomaly

Indicator details

Description	The proportion of live infants born at ≥ 37 completed weeks gestation at the reporting hospital who were transferred/admitted to a neonatal intensive care nursery/unit or special care nursery for reasons other than congenital anomaly.
Purpose	This is an outcome indicator that measures intrapartum morbidity.
Numerator	The number of live babies born at ≥37 completed weeks gestation at the reporting hospital who were transferred/admitted to a neonatal intensive care nursery/unit or special care nursery for reasons other than congenital anomaly.
Denominator	The number of live babies born at ≥37 completed weeks gestation at the reporting hospital.
Computation/Presentation	Numerator/denominator x 100
Presentation	Percentage
Notes and exceptions	A birth is defined as the event in which a baby comes out of the uterus after a pregnancy of at least 20 weeks gestation or weighing 400 grams or more. A live birth is defined by the World Health Organization to be the complete expulsion or extraction from the mother of a baby, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of the voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached. Each product of such a birth is considered live born. A stillbirth is a fetal death prior to the complete expulsion or extraction from its mother of a product of conception of 20 or more completed weeks of gestation or of 400 grams or more birthweight. The death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles. Gestational age is a clinical measure of the duration of the pregnancy. For the National Perinatal Data Collection, gestational age is reported as completed weeks. Births included are live births of babies born at ≥37 completed weeks gestation at the reporting hospital. Births excluded are stillbirths, babies with a congenital anomaly, babies born before 37 completed weeks gestation and babies not born at the reporting hospital. The Australian and New Zealand Neonatal Network (ANZNN 2013) defines the following as high-level neonatal care units: A **neonatal intensive care nursery/unit (NICN/NICU)** is a Level III unit which cares for newborn infants who require more specialised care and treatment. It includes most babies born at less than 32 weeks gestation or less than 1,500 grams birthweight, and others who may require such interventions as intravenous feeding, and/or surgery, and/or cardiorespiratory monitoring for management of apnoea or seizures, and/or require assisted ventilation, and/or supplemental oxygen over 40% or long-term oxygen. A **special care nursery (SCN)** is a Level II nursery which generally cares for babies born at 32–36 weeks gestation weighing around 1,500 to 2,500 grams at birth. It includes care for babies who require intravenous therapy or antibiotics, and/or those who are convalescing after intensive care, and/or those who need their heart rate or breathing monitored, and/or those who need short-term oxygen therapy.

Data collection details

Data source	National Perinatal Data Collection
Data source type	Perinatal NMDS and voluntarily-supplied items
Data items—indicator	Gestational age at birth Birth status

	Neonate transfer to special/neonatal intensive care (item under development)
Data items—disaggregation variables	Year of birth State or territory of birth Hospital annual number of births Hospital sector Level of hospital Hospital location by remoteness Place of birth Indigenous status of mother Indigenous status of baby Labour/non-labour Plurality
Frequency of data source collection(s)	Annual
Additional details	
Comments	Source of definition: ACHS indicator 10.1; Report of the Australian and New Zealand Neonatal Network 2010 (published 2013).

Based on the technical specification, analysis of the NHMD was undertaken to assess the availability of information to support national reporting of this indicator and the quality of data relative to the NPDC to inform the development of this indicator. In the future, data will be available to support the reporting of this indicator from the NPDC—see 'Feasibility of standardising existing data sources' section below.

Data analysis and results

Table 2.1 shows that the main reason for admission to hospital for term babies is *Respiratory conditions* (8,071 babies or 24% of babies admitted). *Birth trauma, birth asphyxia* is the second most common reason for admission (6% of all babies admitted). The least common condition for admission was *Convulsions and other cerebral status disturbances* (0.5% of all babies admitted). Of babies with congenital anomalies, 2,315 were admitted to hospital, comprising 7% of all babies admitted to hospital. These patterns are similar across all years from 2008 to 2011.

Table 2.1: Main reason for admission to hospital for live born babies ≥37 completed weeks gestation, 2011

Description (ICD-10-AM)	Newborn episodes			
	Qualified	Qualified & unqualified	Not qualified	Total
	Number			
Perinatal conditions				
Respiratory conditions (P22–P29)	5,804	2,267	4,968	13,039
Birth trauma, birth asphyxia (P10–P15, P20, P21)	1,498	479	4,399	6,376
Feeding problems (P92)	728	349	4,695	5,772
Transitory disorders of carbohydrate metabolism (P70)	2,604	995	2,001	5,600
Jaundice and complications of jaundice (P57–P59)	1,053	1,064	2,513	4,630
Perinatal infections (P35–P39)	732	458	2,378	3,568
Other specified perinatal conditions (P75–78, P83, P94, P96)	661	263	2,608	3,532
Slow fetal growth or development (P05)	1,481	368	1,460	3,309
Large baby and post-term (P07, P08)	801	251	2,098	3,150
Hypothermia and other temperature regulation (P80, P81)	797	337	2,009	3,143
Perinatal haematological disorders (P60, P61, P50–P56)	300	261	515	1,076
Maternal conditions in pregnancy or childbirth (P00–P04)	173	27	469	669
Other metabolic disorders (P71–P74)	51	42	153	246
Convulsions and other cerebral status disturbances (P90, P91)	139	30	33	202
Congenital anomalies				
(Q00–Q99)	1,954	361	9,220	11,535
Other conditions				
Well baby (Z38)	218	0	151,003	151,221
Observation only, with no other pathology (Z03)	3,911	1,282	14,257	19,450
Any other diagnosis	1,003	483	5,290	6,776
Total number of birth episodes	**23,908**	**9,317**	**210,069**	**243,294**

(continued)

Table 2.1 (continued): Main reason for admission to hospital for live born babies greater ≥37 completed weeks gestation, 2011

Description (ICD-10-AM)	Newborn episodes			
	Qualified	Qualified & unqualified	Not qualified	Total
		Per cent		
Perinatal conditions				
Respiratory conditions (P22–P29)	24.3	24.3	2.4	5.4
Birth trauma, birth asphyxia (P10–P15, P20, P21)	6.3	5.1	2.1	2.6
Feeding problems (P92)	3.0	3.7	2.2	2.4
Transitory disorders of carbohydrate metabolism (P70)	10.9	10.7	1.0	2.3
Jaundice and complications of jaundice (P57–P59)	4.4	11.4	1.2	1.9
Perinatal infections (P35–P39)	3.1	4.9	1.1	1.5
Other specified perinatal conditions (P75–78, P83, P94, P96)	2.8	2.8	1.2	1.5
Slow fetal growth or development (P05)	6.2	3.9	0.7	1.4
Hypothermia and other temperature regulation (P80, P81)	3.3	3.6	1.0	1.3
Large baby and post-term (P07, P08)	3.4	2.7	1.0	1.3
Perinatal haematological disorders (P60, P61, P50–P56)	1.3	2.8	0.2	0.4
Maternal conditions in pregnancy or childbirth (P00–P04)	0.7	0.3	0.2	0.3
Convulsions and other cerebral status disturbances (P90, P91)	0.6	0.3	0.0	0.1
Other metabolic disorders (P71–P74)	0.2	0.5	0.1	0.1
Congenital anomalies				
(Q00–Q99)	8.2	3.9	4.4	4.7
Other conditions				
Well baby (Z38)	0.9	0.0	71.9	62.2
Observation only, with no other pathology (Z03)	16.4	13.8	6.8	8.0
Any other diagnosis	4.2	5.2	2.5	2.8
Total	**100.0**	**100.0**	**100.0**	**100.0**

Source: AIHW National Hospital Morbidity Database.

Quality of data

- The number of birth episodes for term babies was derived from a number of codes:
  - diagnostic code Z38 was used to capture inborn and outborn babies
  - qualification status: the number of babies with all qualified or some qualified days was used to capture whether babies had been admitted to hospital
  - birth episodes that include a diagnosis of short gestation (preterm birth): in order to capture term babies, babies with short gestation were excluded.
- Primary diagnoses in the birth episode were used to show the reason for admission. Note that about 30% of babies with unqualified days, that is non-admitted babies, also had primary diagnoses suggesting some pathology. Hence, the use of qualified days as a proxy for admission is not perfect.
- There are a number of coding inconsistencies in the hospital data which draw into question the accuracy of the data:

  - Inconsistencies were predominantly for birth episodes with qualified days, that is, babies who were admitted and the ones of interest in this analysis. Higher rates of inconsistency are evident when data are stratified by admission based on qualification status.
  - In the 4 years from 2008 to 2011, 5% of birth episodes contained inconsistent data. There is substantial variation in the proportions of birth episodes with inconsistent data across states and territories, for example 11% of birth episodes in New South Wales, 7% in Tasmania and 6% in South Australia.
- When NHMD data are compared with the NDPC, there are discrepancies between the numbers of birth episodes for babies with qualified days (admitted babies) from NHMD and babies from NPDC reported to have been admitted for neonatal special or intensive care. This is predominantly among term babies, that is, the population of interest. The same pattern of results occurs across the 2008–2011 reporting period.
- States other than New South Wales and Victoria have more birth admission episodes in the NHMD than babies reported as having been admitted for neonatal special or intensive care in the NPDC. This may partly reflect babies born outside of New South Wales and Victoria having NICU/SCN admission in these states. It may also reflect the timing of reporting NPDC data—if records are completed soon after birth, babies who were admitted later (that is, those with both qualified and unqualified days) could be missed, as data is collected from midwives and other staff using information obtained from the mother and from hospital or other records close to the time of birth.
- Data on admission to SCN or NICU are submitted to the NPDC but are not routinely published. Table 2.2 summarises what jurisdictions currently collect on their data collection forms. There is jurisdictional variation in who is counted in the admissions—for example, in Victoria, babies born at a planned homebirth and then admitted to SCN/NICU, babies transferred to the SCN/NICU of another hospital, and babies who were discharged and then admitted to SCN/NICU are not included.
- There are some slight differences in response category definitions for admission to SCN/NICU (Table 2.3).

Table 2.2: Summary of jurisdictional data on admission to SCN/NICU

Response categories	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Admitted (SCN or NICU)	X	X	X	X[(a)]	X[(b)]	X	X	X
Number of days			X	X	X	X	X	
Main reason for admission			X					
Was congenital condition the main reason for admission?	X				X			
Transferred to (specify/establishment code)[(c)]		X		X				

(a) Most jurisdictions have yes/no response categories for admission to SCN/NICU; however WA would derive this from number of days, as they do not have a field for admission alone.

(b) Most jurisdictions combine SCN and NICU in the admitted response category; however SA and Victoria specify the level of care which a baby is admitted to.

(c) May be relevant for small hospitals without an SCN or NICU.

Source: Maternity Information Matrix.

Table 2.3: Summary of jurisdictional definitions for admission to SCN/NICU

Jurisdiction	Definitions
NSW	A baby separated from its mother for the purposes of receiving observation, special treatment or intensive care
Vic	Whether the neonate was admitted into SCN or NICU
Qld	No definition specified
WA	No definition specified
SA	If the baby required SCN, or was admitted to NICU
Tas	If the baby cared for in SCN, or intensive care unit because of a medical condition
ACT	No definition specified
NT	No definition specified

Source: Maternity Information Matrix.

In summary, there are problems with data quality in both hospital data and NPDC data. These two data sources should in theory align closely for the number of newborns admitted to hospital. Overall, it appears that the NPDC captures data better for pre-term than term babies; however this appears to be the case only in some states.

Feasibility of standardising existing data sources

The available data from both the NHMD and NPDC are currently too poor to permit any level of reporting on this indicator.

A national standard data item, *Neonate transfer to special/neonatal intensive care,* has been proposed for inclusion in the Perinatal NMDS as part of the NMDDP work program. The technical specification for this NCMI (Indicator 12) incorporates definitions and guidelines from this data item. In addition, a data item to collect *Reason for admission to SCN/NICU* that includes congenital anomaly as a data value, or a flag to indicate that an admission to the SCN/NICU was for a reason other than a congenital anomaly, would capture the data needed for this indicator.

In relation to the NHMD, even if data quality could be improved, the data are still limited in what they can provide in terms of other breakdowns, however, cross-checks could continue to be performed against these data to check the consistency between the two collections.

Recommendations for next steps

- Consideration should be given to developing a *Reason for admission to SCN/NICU* data item that includes congenital anomaly as a data value, for inclusion in the Perinatal NMDS that will enable future reporting against the indicator 'Babies born ≥37 completed weeks gestation admitted to a neonatal intensive care nursery or special care nursery for reasons other than congenital anomaly'.
- Alternatively, a flag to indicate an admission to the SCN/NICU for a reason other than a congenital anomaly could be considered for inclusion in the Perinatal NMDS.
- Cross-checks continue to be performed between NHMD and NPDC data to monitor consistency between the two collections.

2.1.2 Indicator 13: Third and fourth degree tears for (a) all first births and (b) all births

During discussions, ECG members noted that third and fourth degree tears cause significant, ongoing maternal morbidity and that rates suggest that tears have been increasing. It is important to measure what is actually occurring, as the increase may be due to better reporting or may be due to an actual increase in tears. ECG members also noted that differentiating between tears with and without episiotomy was important.

The following technical specification incorporates these recommendations.

13. Third and fourth degree tears for (a) all vaginal first births and (b) all vaginal births

Indicator details

Description	The proportion of women who have a third or fourth degree perineal laceration after giving birth vaginally for (a) all first births and (b) all births.
Purpose	Third and fourth degree perineal lacerations cause significant ongoing maternal morbidity. This is an outcome indicator that measures their occurrence.
Numerator part (a)	The number of women who had a third or fourth degree perineal laceration after giving birth for the first time and who had a vaginal birth.
Denominator part (a)	The number of women who gave birth for the first time and who had a vaginal birth.
Numerator part (b)	The number of women who had a third or fourth degree perineal laceration after giving birth vaginally.
Denominator part (b)	The number of women who gave birth vaginally.
Computation/Presentation	Numerator/denominator x 100
Presentation	Percentage
Notes and exceptions	A birth is defined as the event in which a baby comes out of the uterus after a pregnancy of at least 20 weeks gestation or weighing 400 grams or more. Births included are vaginal births, including non-instrumental and instrumental births. A non-instrumental vaginal birth is one in which the baby is born through the vagina without the assistance of instruments. An instrumental birth is a procedure that uses instruments (forceps or vacuum extraction) to assist the baby to come out through the vagina. Births excluded are caesarean sections. Postpartum perineal status is defined as: **1st degree laceration/vaginal graze (Code 2)**—Graze, laceration, rupture or tear of the perineal skin during delivery that may be considered to be slight or that involves one or more of the following structures: • fourchette • labia • vagina • vulva.

	2nd degree laceration (Code 3)—Perineal laceration, rupture or tear as in Code 2 occurring during delivery, also involving: • pelvic floor • perineal muscles • vaginal muscles. Excludes laceration involving the anal sphincter. **3rd degree laceration (Code 4)**—Perineal laceration, rupture or tear as in Code 3 occurring during delivery, also involving: • anal sphincter • rectovaginal septum • sphincter not otherwise specified (NOS). Excludes laceration involving the anal or rectal mucosa. **4th degree laceration (Code 7)**—Perineal laceration, rupture or tear as in Code 4 occurring during delivery, also involving: • anal mucosa • rectal mucosa.
Data collection details	
Data source	National Perinatal Data Collection
Data source type	Perinatal NMDS or voluntarily-supplied items
Data items—indicator	Parity Method of birth Postpartum perineal status (under development)
Data items— disaggregation factors	Year of birth State or territory of birth Hospital annual number of births Hospital sector Remoteness category (from mother's area of usual residence) Indigenous status of mother With and without episiotomy Mother's country of birth
Frequency of data source collection(s)	Annual
Additional details	
Comments	Source of definition: CMIP indicator 5 modified to include all births; Perinatal National Minimum Data Set (Female [mother]–postpartum perineal status ref. 423659)

Based on the technical specification, analysis of the NPDC was undertaken to inform the development of this indicator.

Data analysis and results

Parity

- In 2007–2010, third and fourth degree tears combined occurred in 4.3% of first-time mothers and 2.3% of all mothers who had a vaginal birth (Figure 2.1).
- The proportion of third and fourth degree tears combined was highest in mothers aged 25–29 years compared with other age groups among both first-time and all mothers (5.1% of first–time mothers and 2.9% of all mothers respectively compared with 4.3% and 2.3% for all age groups combined) (Figure 2.4).
- For first-time mothers and all mothers, third/fourth degree tears were more common in non–Indigenous mothers than in Indigenous mothers (4.3% and 2.4% for first-time and all non-Indigenous mothers respectively, compared with corresponding figures of 3.7% and 1.6% for Indigenous mothers).
- Among first-time mothers and all mothers internationally, proportions of third/fourth degree tears were highest in mothers born in India (10.6% and 8.1% respectively), the

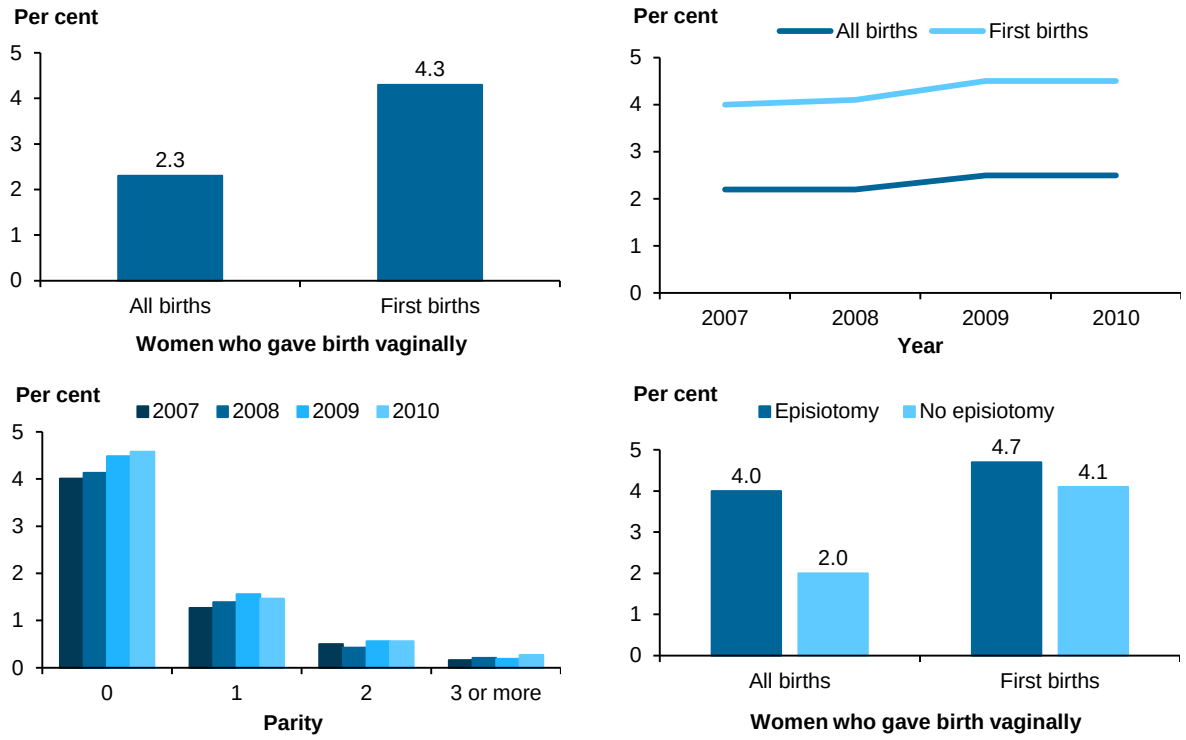
Philippines (8.6% and 4.7%), and China and Hong Kong (combined) (7.2% and 5.1%) (Figure 2.4).

Method of birth

- The proportion of third/fourth degree tears among first-time mothers who had a vaginal birth increased marginally from 4.0% in 2007 to 4.6% in 2010, while among all mothers who had a vaginal birth the proportion rose from 2.2% in 2007 to 2.5% in 2010 (Figure 2.1).
- The proportion of third/fourth degree tears among first-time mothers who had a vaginal birth varied by jurisdiction and was lowest in Tasmania (2.4%) and highest in Western Australia (5.5%) (Figure 2.2).
- 4.9% of first-time mothers and 2.6% of all mothers who had a vaginal birth in a public sector hospital had a third/fourth degree tear, compared with 2.6% of first-time mothers and 1.5% of all mothers who had a vaginal birth in a private sector hospital (Figure 2.2).
- First-time mothers who had an instrumental vaginal birth were more likely than those who had a non–instrumental vaginal birth to have a third/fourth degree tear (6.7% and 3.2% respectively) (Figure 2.3). There was a similar pattern among all mothers (6.0% instrumental and 1.6% non-instrumental respectively.

Postpartum perineal status

- The proportion of third/fourth degree tears with episiotomy among all mothers was higher than for mothers with third/fourth degree tears without episiotomy (4.0% compared with 2.0%) (Figure 2.3). First–time mothers were more likely than all mothers to have third/fourth degree tears with episiotomy (4.7% compared with 4.0%). However, 4.1% of first-time mothers also had third/fourth degree tears without an episiotomy.
- For all mothers, the proportion of third/fourth degree tears was lowest in Tasmania (1.3%) and highest in Western Australia, Northern Territory and the Australian Capital Territory (2.9%, 2.9% and 2.8% respectively).

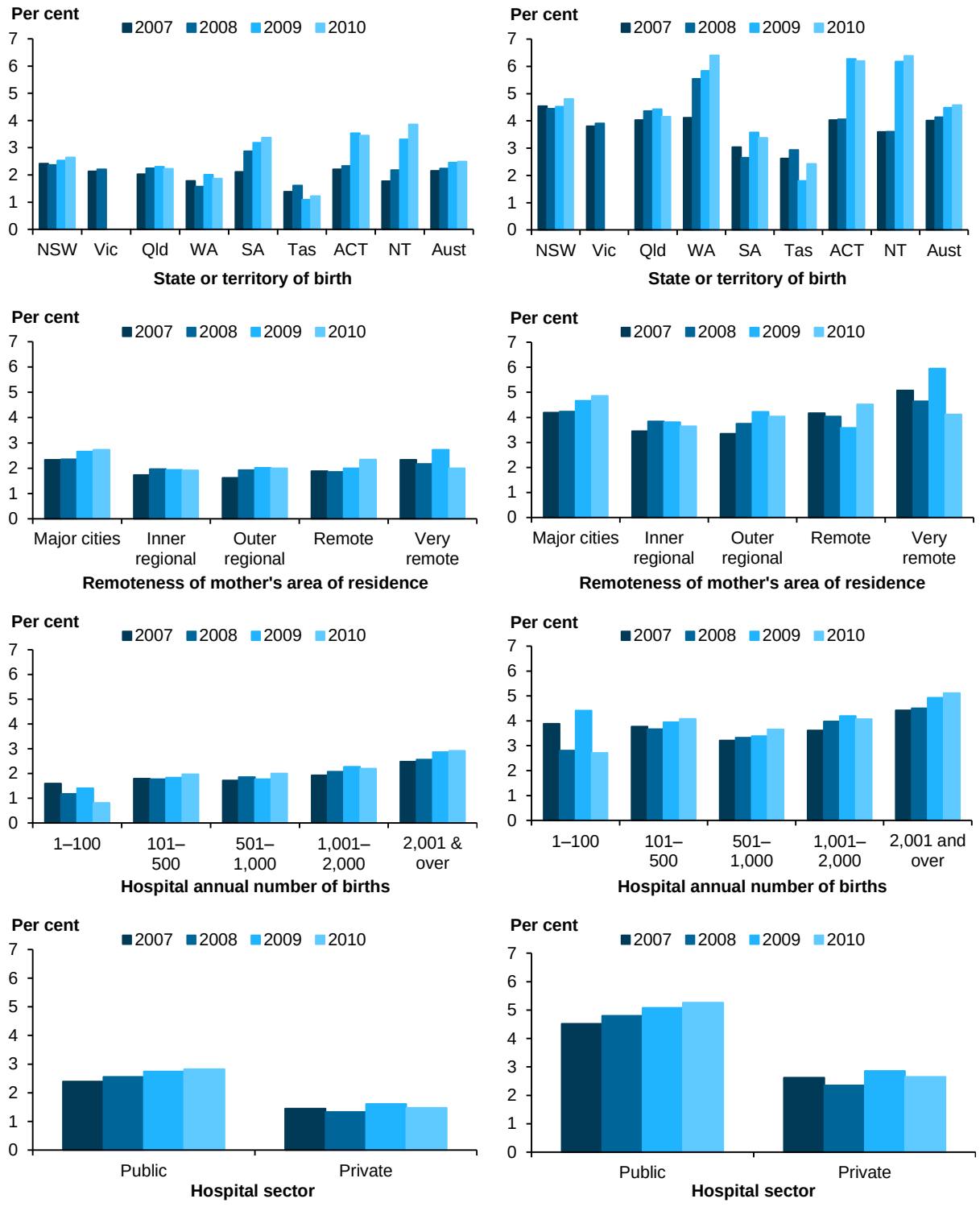


Notes

1. Data collection for third and fourth degree tears was not standardised during the reference period.
2. Data on perineal status were not available for Victoria for 2009 and 2010.

Source: AIHW National Perinatal Data Collection.

Figure 2.1: Third and fourth degree tears for women who gave birth vaginally, 2007–2010

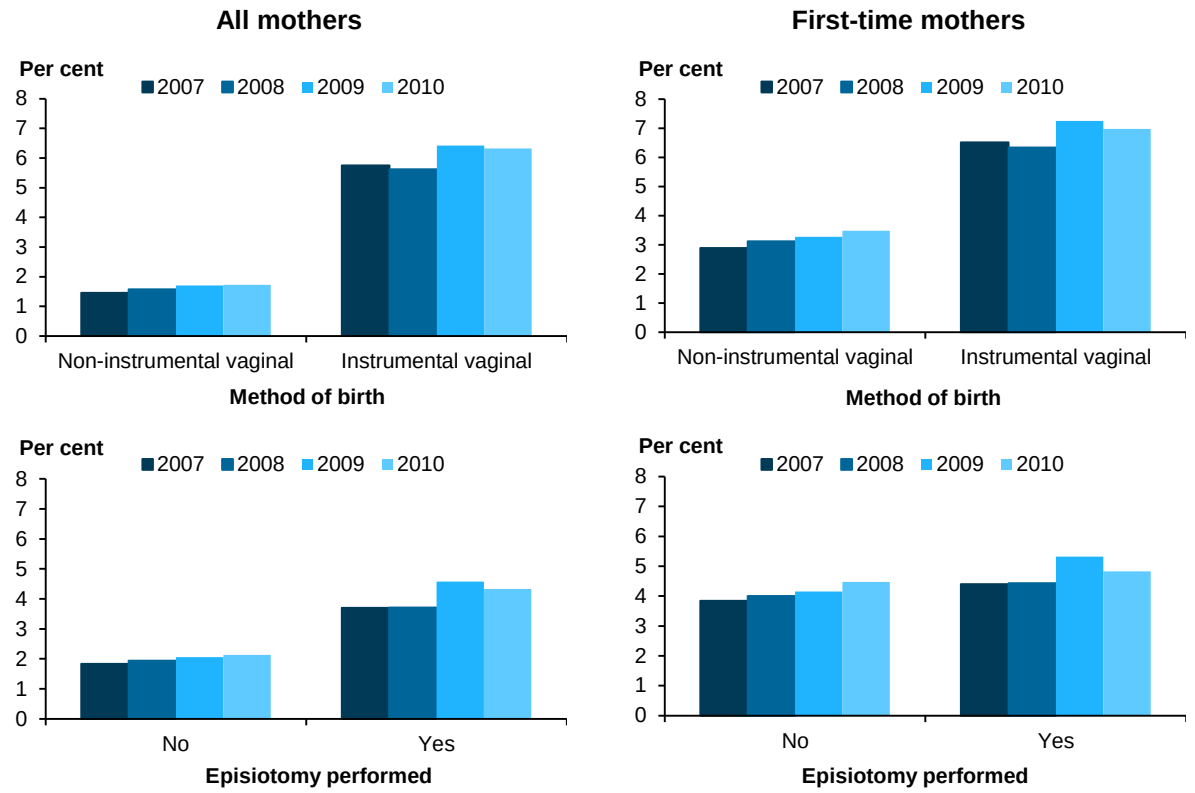


Notes:

1. Data collection for third and fourth degree tears was not standardised during the reference period.
2. Remoteness was assigned using the ABS Australian Standard Geographical Classification (ASGC) remoteness structure applied to Statistical Local Area or postal area of mother's area of usual residence.

Source: AIHW National Perinatal Data Collection.

Figure 2.2: Third and fourth degree tears for all women who gave birth vaginally, all mothers and first-time mothers, by geographic and hospital characteristics, 2007–2010

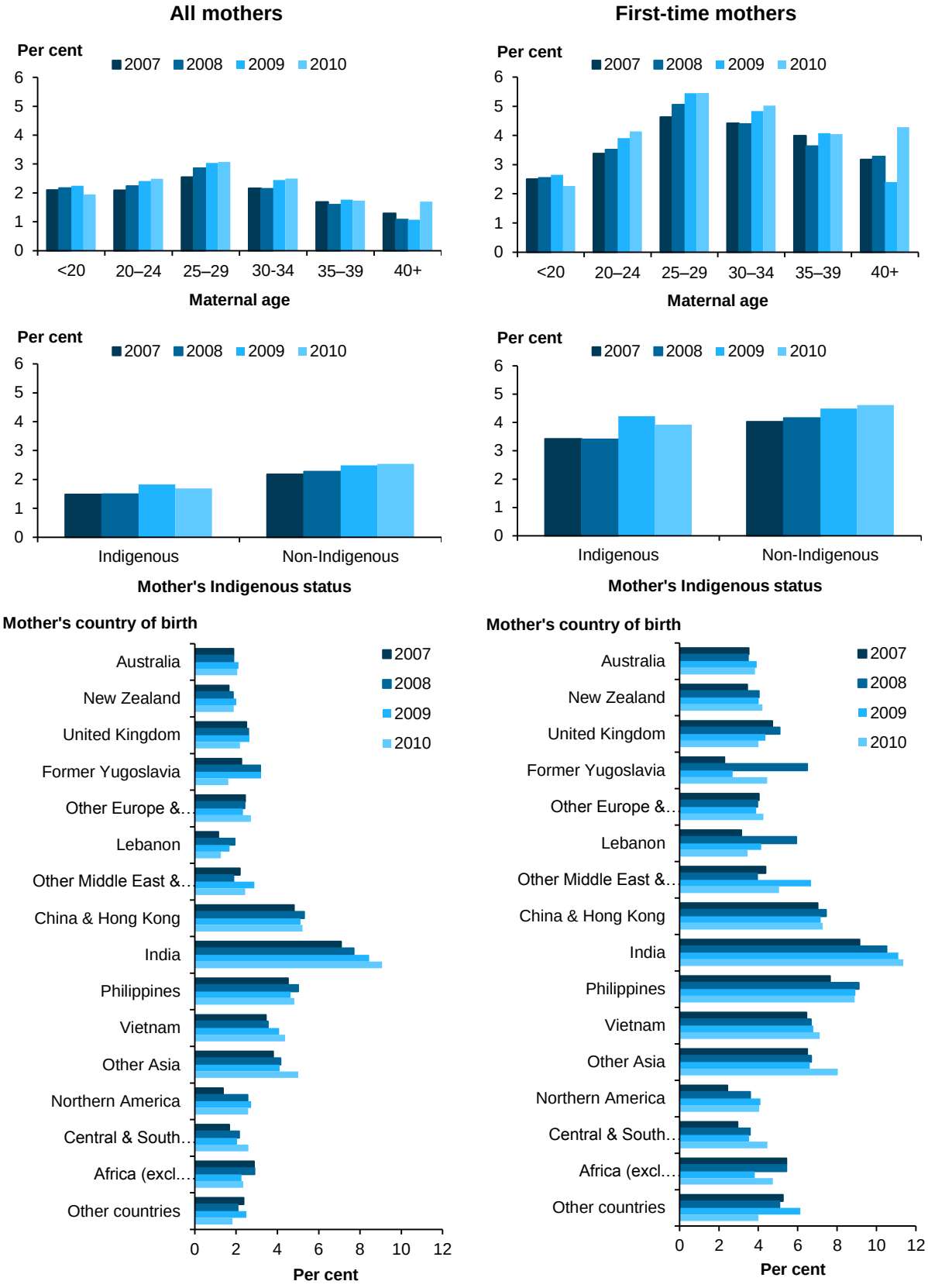


Notes

1. Data collection for third and fourth degree tears was not standardised during the reference period.
2. Data on perineal status were not available for Victoria for 2009 and 2010.

Source: AIHW National Perinatal Data Collection.

Figure 2.3: Third and fourth degree tears for all women who gave birth vaginally, all mothers and first-time mothers, by delivery characteristics, 2007–2010



Note: Data collection for third and fourth degree tears was not standardised during the reference period.

Source: AIHW National Perinatal Data Collection.

Figure 2.4: Third and fourth degree tears for all women who gave birth vaginally, all mothers and first-time mothers, by maternal characteristics, 2007–2010

Quality of data

- Data collection for third and fourth degree tears was not standardised during the reference period.
- Data on perineal status were not available for Victoria for 2009 and 2010 at the time of preparing this report.
- There are some differences across jurisdictions in the response categories (Table 2.4) and response category definitions (Table 2.5) for third and fourth degree tears. The ACT records third and fourth degree tears in its hospital adverse incident system which may explain higher reporting of the condition.
- Data collection for determining if the woman was a first-time mother was not standardised during the reference period. Some jurisdictions used *Parity* which was defined as the total number of previous pregnancies experienced by the woman that have resulted in a live birth or a stillbirth. However, some jurisdictions (such as Western Australia) used other data items to determine if a woman who is currently pregnant has had no previous infants born.

Table 2.4: Summary of jurisdictional response categories for perineal status

Response categories	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
3rd degree tear/laceration[(a)]	X		X	X	X	X	X	X
4th degree tear/laceration [(a)]	X		X	X	X	X	X	X
Degree/type (specify)[(b)]		X						

(a) There are differences across jurisdictions in terminology. Some use the term 'tear', others use 'laceration'.

(b) Some jurisdictions have separate codes/tick boxes for 1st, 2nd, 3rd and 4th degree tears, but others ask midwives to specify degree/type in a single field.

Table 2.5: Summary of jurisdictional definitions for perineal status

Jurisdiction	3rd degree tear	4th degree tear
NSW	A perineal laceration or tear involving the anal sphincter or recto vaginal septum	A third degree perineal laceration or tear that also involves the anal mucosa or rectal mucosa
Vic	Perineal laceration: Only refers to lacerations of the perineum which does not include vaginal wall, labial, cervical or clitoral lacerations. The degree of the laceration should be reported in Degree/type (specify)	Perineal laceration: Only refers to lacerations of the perineum which does not include vaginal wall, labial, cervical or clitoral lacerations. The degree of the laceration should be reported in Degree/type (specify)
Qld	Tear or laceration involving the anal sphincter or recto vaginal septum	Third degree tear or laceration also involving the anal mucosa or rectal mucosa
WA	No definitions specified	No definitions specified
SA	No definitions specified	No definitions specified
Tas	Involves the external sphincter, and the anal mucosa	Includes the anal canal/rectum
ACT	No definitions specified	No definitions specified
NT	No definitions specified	No definitions specified

Source: Maternity Information Matrix.

Feasibility of standardising existing data sources

An endorsed national standard data item *Postpartum perineal status* has been included in the Perinatal NMDS since 1 July 2013. The technical specification for this NCMI (Indicator 13) incorporates the definitions and guidelines from this data item. Data based on the national standard will be available from December 2015.

No further development work is required for this Indicator.

Recommendations for next steps

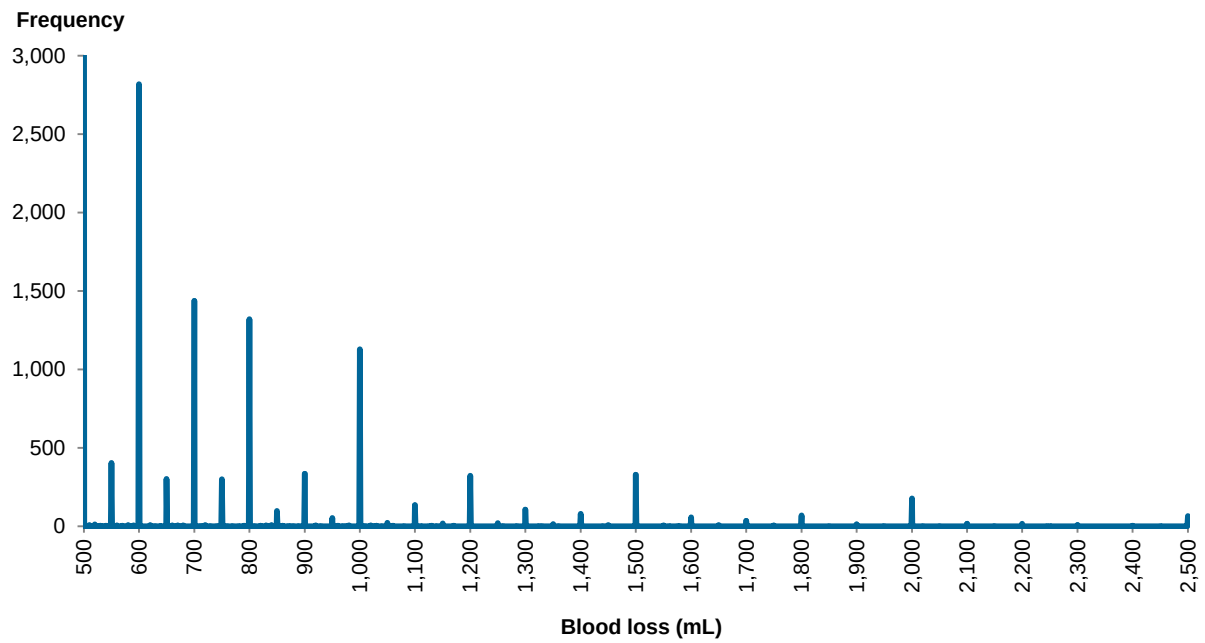
- Data currently available for this indicator are considered to be of sufficient quality for reporting purposes.
- It is recommended that this indicator be added to the set of NCMIs for reporting and be accompanied by clinical commentary.

2.1.3 Indicator 14: Blood loss of (i) >1,000 mL and <1,500 mL and (ii) ≥1,500 mL during first 24 hours after the birth of the baby for (a) vaginal births and (b) caesarean sections

A concurrent AIHW and NPESU project, the NMDDP, involves undertaking work on options to enhance nationally consistent and comprehensive maternal and perinatal data collection in Australia. As part of this project, a data item *Severe primary postpartum haemorrhage* (PPH) has been prioritised for data development and inclusion in a Perinatal Data Set Specification (DSS) and eventually the Perinatal NMDS. The NMDDP established a Clinical and Data Reference Group (CDRG) to inform and make decisions on national standards for this and other data items. To maximise alignment between the NMDDP and NCMI projects, information has been shared between the ECG and CDRG and has informed discussions and recommendations. Following is a summary of the information and issues discussed by both groups.

Current collection

There is considerable variation in the way jurisdictions currently collect information about blood loss in the NPDC. Some jurisdictions collect primary and secondary PPH and measure it according to estimated millilitres (mL) lost, while others collect transfusion alone or in conjunction with mL lost. In many jurisdictions there is no way to distinguish between severe and non-severe PPH (see Table 2.6).



Source: Unpublished perinatal data.

Figure 2.5: Example of frequency of blood loss (mL), 2011

Those jurisdictions that do collect blood loss in an open numeric field report that it works well. Figure 2.5 shows the results for one jurisdiction for the frequency of blood loss to the nearest mL, demonstrating how accurately it is being collected, and how it allows for the data to be cut to different severity categories depending on the purpose, including the categories specified for this indicator.

Table 2.6: Postpartum haemorrhage response categories used in jurisdictions[a]

Response category	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Postpartum haemorrhage requiring blood transfusion—no units specified	X	X						
PPH/Blood loss—no volume categories or only one category for >500mL[b]		X[c]		X		X[d]	X	X
PPH/Blood loss (mL)—with 2 or more volume categories			X[e]		X			
Notes								
Can distinguish between severe and non-severe[f]		X	X		X			
Separates primary and secondary PPH		X[g]	X		X[g]	X[g]		

(a) The response categories listed here are as shown on perinatal forms (except for NT which only has electronic data capture). Additional information may be collected in those jurisdictions with electronic maternity information systems.

(b) Without specifying volume categories it is not currently possible to distinguish Severe PPH from PPH (except in Victoria where there is a field for entering the number of mL).

(c) Victoria does not have volume categories but is the only state to record any amount of blood loss and hence it should be possible to create categories from the raw data. Note that no minimum blood loss is specified.

(d) Jurisdictional feedback indicated Tasmania also collects 4 volume categories electronically, but this does not appear on the PDC form.

(e) Queensland collect Primary PPH with volume categories under Labour and Delivery Complications but collect Secondary PPH under Discharge Details with only a tick box and no volume.

(f) This depends on how 'severe' is defined. For the purposes of the table above 'severe' is >1,000mL and 'non-severe' is ≤1,000mL.

(g) Only collects primary. In Victoria, although there is no specification on the form, the guidelines state that the item is for blood loss at the time of birth and in the following 24 hours, or up until the time of discharge if occurring before 24 hours.

Volume and transfusion measures

Consideration was given to the best way to obtain a consistent measure of PPH, via a volume of blood lost or by a measure of blood transfusion, or both.

Historical information on the selection of the volume measure for this NCMI is available in the Women's Hospitals Australasia (WHA) report on the development of the core maternity indicators. Despite the acknowledged problems of estimating blood loss accurately, the volume measure was preferred to transfusion as 'the need for transfusion is not wholly dependent upon the volume of blood loss. It is very individual and may occur with small blood losses in women with pre-existing conditions' (WHA 2007).

Amount of blood loss

The WHA report noted that the choice of 1,000 mL as the lower threshold for blood loss was related to the fact that this volume 'corresponds to the 95th percentile for blood loss associated with spontaneous vaginal delivery', and that blood loss of this amount is 'associated with significant maternal morbidity and a small but consistent maternal mortality rate' (WHA 2007).

The ECG commented during initial development of this NCMI that >1,000 mL was also preferred because if >1,500 mL was selected this implied that a blood loss of 1,500 mL was acceptable, which is not the case. The ECG noted, however, that in caesarean births blood loss of 1,000 mL is fairly common.

Severity measures

This NCMI is for 'significant' primary PPH, whereas the NMDDP item is for 'severe' primary PPH. There were discussions around the importance of aligning the NMDDP item and the indicator.

CDRG members indicated that blood loss of over 1,500 mL would better capture severe primary PPH. They also noted that most women with a normal haemoglobin level for pregnancy at term will tolerate a PPH of 1,000 mL well.

The ECG recommended that the lower threshold of 1,000 mL be retained but that the indicator include categories of blood loss for both >1,000 mL but <1,500 mL and (b) ≥1,500 mL.

It was noted that the use of categories has the disadvantage of estimation around the margins being difficult.

An open numeric field for estimated blood loss was discussed. This could be coded to whichever categories were required for NCMI or other reporting, and removes the issue of having to choose a range. However, it does not eliminate all difficulties as the clinician still has to make decisions about the amount of blood loss.

Recommendations

Following discussions at their meeting in May 2013, the CDRG recommended a volume measure that records the mL of blood loss in an open numeric field and a data item to capture whether a transfusion occurred. All volume measures will have the limitation of accurate measurement of blood loss. The addition of a transfusion item would be an indication of whether the woman was compromised or not (except for women who refuse transfusion). The item cannot account for the different policies and practices of hospitals in relation to transfusion; however the combination of measures (volume and transfusion) would assist to provide a clearer picture of the severity of the haemorrhage for most women.

This approach aligns with the NCMI and allows for the data to be grouped into different qualitative categories as required, for example 'severe' and 'significant'. The item to capture whether a transfusion occurred will enable additional information on severity to be provided.

On the basis of this recommendation for an open numeric field, this NCMI should be revised to be ≥ 1,000 mL, as there will be a tendency for rounded estimates such as 1,000 mL or 1,500 mL. Based on the current definition, if a clinician enters 1,000 mL it would not be included in this indicator.

Following consultation with the MSIJC, they recommended that this Indicator align with the data items in the 2014–15 Perinatal DSS.

The following technical specification incorporates these recommendations.

14. Blood loss of (i) ≥1,000 mL and <1,500 mL and (ii) ≥1,500 mL during first 24 hours after the birth of the baby for (a) vaginal births and (b) caesarean sections

Indicator details

Description	The proportion of women with blood loss of (i) ≥1,000 mL and <1,500 mL and (ii) ≥1,500 mL during the first 24 hours after the birth of the baby for (a) vaginal births and (b) caesarean sections
Purpose	This is an outcome indicator.
Numerator part (i) (a)	The number of women who had blood loss of ≥1,000 mL and < 1,500 mL during the first 24 hours after giving birth vaginally.
Denominator part (i) (a)	The number of women who gave birth vaginally.
Numerator part (ii) (a)	The number of women who had blood loss of ≥1,500 mL during the first 24 hours after giving birth vaginally.
Denominator part (ii) (a)	The number of women who gave birth vaginally.
Numerator part (i) (b)	The number of women who had blood loss of ≥1,000 mL and <1,500 mL during the first 24 hours after giving birth by caesarean section.
Denominator part (i) (b)	The number of women who gave birth by caesarean section.
Numerator part (ii) (b)	The number of women who had blood loss of ≥1,500 mL during the first 24 hours after giving birth by caesarean section.
Denominator part (ii) (b)	The number of women who gave birth by caesarean section.
Computation/Presentation	Numerator/denominator x 100
Presentation	Percentage
Notes and exceptions	A birth is defined as the event in which a baby comes out of the uterus after a pregnancy of at least 20 weeks gestation or weighing 400 grams or more. Blood loss is defined as blood loss of (i) ≥1,000 mL and < 1,500 mL and (ii) ≥1,500 mL within 24 hours of the birth of the baby. All women who gave birth are included.

Data collection details

Data source	National Perinatal Data Collection
Data source type	Perinatal NMDS and voluntarily-supplied items
Data items—indicator	Method of birth Primary postpartum haemorrhage indicator (item under development) Estimated blood loss due to primary postpartum haemorrhage (item under development) Blood transfusion due to primary postpartum haemorrhage indicator (item under development)
Data items— disaggregation factors	Year of birth State or territory of birth Hospital annual number of births Hospital sector Remoteness category (from mother's area of usual residence) Indigenous status of mother
Frequency of data source collection(s)	Annual

Additional details

Comments	Source of definition: CMIP 9, modified to include all births and major and severe PPH.

Based on the technical specification, analysis of the NHMD was undertaken to inform the development of this indicator. In the future, data will be available to support the reporting of this indicator from the NPDC—see 'Feasibility of standardising existing data sources' section below.

Data analysis and results

ICD-10-AM diagnostic codes recorded in maternity episodes were used to identify maternity episodes with PPH, and ACHI codes to identify blood transfusion procedures in the NHMD in the period 2008–2011 (Box 2.1). These codes do not provide information about the amount of blood loss. Use of blood transfusion during the maternity episode suggests substantial blood loss. However, this is a blunt measure because transfusion may have commenced before the baby was born, and the need for transfusion may reflect other conditions such as anaemia, antepartum or intrapartum bleeding. Caesarean birth can be identified both from ICD-10-AM codes and ACHI codes associated with maternity episodes (Box 2.1).

Box 2.1: Codes used in NHMD analysis

ICD-10-AM codes for PPH and transfusion

O72.0 Third-stage haemorrhage

O72.1 Other immediate postpartum haemorrhage

O72.2 Delayed and secondary postpartum haemorrhage

O72.3 Postpartum coagulation defects

ACHI codes for transfusion

13706–01 Administration of blood

13706–02 Administration of packed cells

13706–03 Administration of platelets

38588–00 Administration of erythrocytes

92060–00 Administration of autologous blood

92061–00 Administration of coagulation factors

92062–00 Administration of fresh frozen plasma

92063–00 Administration of plasma expander

ICD-10-AM and ACHI codes for caesarean section

ACHI

16520–00 Classical elective

16520–01 Classical emergency

16520–02 Lower segment elective

16520–03 Lower segment emergency

ICD-10-AM

O82 Single delivery by caesarean section

O84.2 Multiple delivery, all by caesarean section

O84.82 Multiple delivery by combination of methods

- PPH is vaginal bleeding after the baby is born. The third stage of labour is the period from the birth of the baby to the expulsion/removal of the placenta. Third-stage haemorrhage (O72.0 in Box 2.1) and immediate PPH (O72.1) together align most closely with PPH in the first 24 hours.
- There can be more than 1 type of PPH diagnosis in a maternity episode.
- Hierarchical categories aggregate PPH category combination(s) according to the timing after birth, which is broadly associated with underlying pathology: third-stage

haemorrhage associated with retained placenta/membranes or uterine atony; delayed haemorrhage with infection; coagulopathy with other conditions, for example, pre-eclampsia.

- Delayed haemorrhage diagnosis is usually bleeding 48 hours or more after giving birth—most commonly 2–10 days later. Most will not be captured within the maternity episode, but are included here for completeness.
- Table 2.7 shows the number and proportion of maternity episodes by PPH and hierarchical categories in the 2008–2011 reference period. The proportion of maternity episodes with PPH immediately after birth was highest (7.5%).

Table 2.7: PPH categories, 2008–2011

PPH category	Number	Per cent
3rd stage	13,133	1.12
3rd stage and delayed	75	0.01
3rd stage and coagulopathy	55	0.00
Total 3rd stage	*13.263*	*1.13*
Immediate	86,895	7.43
Immediate and delayed	231	0.02
Immediate and coagulopathy	230	0.02
Immediate, delayed and coagulopathy	2	0.00
Total immediate	*87,358*	*7.47*
Delayed	4,779	0.41
Delayed and coagulopathy	20	0.00
Total delayed	*4,799*	*0.41*
Coagulopathy	566	0.05
Any PPH	105,986	9.07
No PPH	1,063,004	90.93
Total	**1,168,990**	**100.0**

Note: There can be more than one type of PPH diagnosis in a maternity episode.

Source: AIHW National Hospital Morbidity Database.

- Table 2.8 shows the number and proportion of transfusion (blood or blood products) by the PPH category in the 2008–2011 reference period. (Note: Transfusion can be carried out in maternity episodes without a PPH diagnosis, as PPH is not the only reason for transfusion.)
- The proportion transfused was highest in maternity episodes with PPH immediately after birth (25.4%).

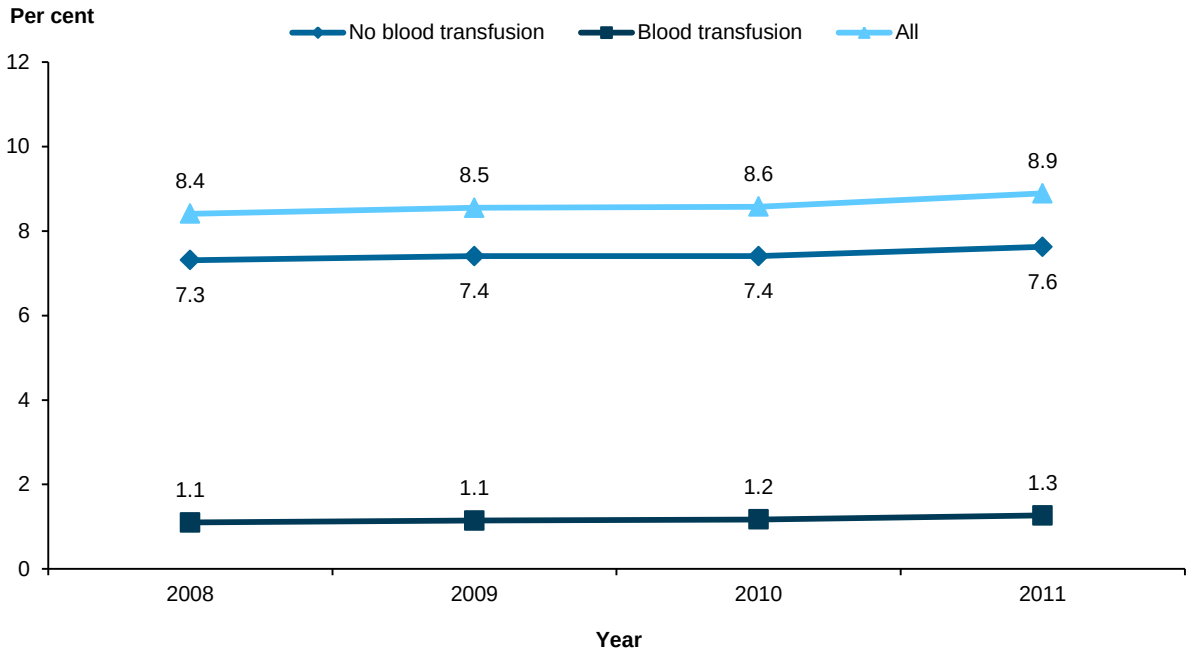
Table 2.8: PPH and transfusion, 2008–2011

PPH category	Transfused	Not transfused	Total	% transfused
3rd stage	3,118	10,145	13,263	12.1
Immediate	10,565	76,793	87,358	25.4
Delayed	1,221	3,578	4,799	23.9
Coagulopathy	135	431	566	23.5
None	5,684	1,057,320	1,063,004	0.5
Total	**20,723**	**1,148,267**	**1,168,990**	**1.8**

Notes

1. Transfusion includes the use of blood, blood products and plasma expanders.
2. There can be more than one type of PPH diagnosis in a maternity episode.

Source: AIHW National Hospital Morbidity Database.



Notes

1. Transfusion includes the use of blood, blood products and plasma expanders.
2. There can be more than one type of PPH diagnosis in a maternity episode.

Source: AIHW National Hospital Morbidity Database.

Figure 2.6: Maternity episodes with third-stage and immediate PPH, 2008–2011

- There was a small increase, from 8.4% to 8.9%, over the period 2008–2011 for women having a PPH. This may reflect a diagnostic shift, and changes in coding standards and policies (Figure 2.6).

Table 2.9: Maternity episodes with third-stage and immediate PPH, by selected characteristics, 2008–2011 (per cent)

	Not transfused				Transfused				All			
	2008	2009	2010	2011	2008	2009	2010	2011	2008	2009	2010	2011
State or territory of birth												
NSW	6.2	6.4	6.5	7.0	0.9	1.0	1.0	1.1	7.1	7.4	7.5	8.1
Vic	8.8	9.0	8.9	8.8	1.3	1.3	1.3	1.4	10.1	10.3	10.2	10.2
Qld	5.0	5.3	5.8	5.9	1.0	1.0	1.1	1.2	6.0	6.4	7.0	7.1
WA	11.4	10.4	9.1	9.2	1.2	1.3	1.2	1.2	12.6	11.7	10.2	10.4
SA	7.7	7.9	7.6	8.0	1.7	1.5	1.5	1.5	9.4	9.4	9.0	9.5
Tas	5.8	5.7	5.6	7.1	0.9	0.8	0.9	1.2	6.7	6.5	6.5	8.2
ACT	7.2	8.2	8.9	8.2	1.3	1.2	1.4	1.4	8.5	9.5	10.3	9.6
NT	11.0	12.0	13.5	13.1	2.1	2.1	2.1	2.6	13.1	14.1	15.6	15.7
Australia	7.3	7.4	7.4	7.6	1.1	1.1	1.2	1.3	8.4	8.5	8.6	8.9
Hospital sector												
Public	8.8	8.8	8.8	9.0	1.3	1.4	1.4	1.5	10.1	10.2	10.2	10.5
Private	3.6	3.7	3.7	3.9	0.6	0.6	0.6	0.6	4.2	4.3	4.4	4.5
Maternal age												
Less than 20	7.3	8.2	8.2	7.9	1.6	1.9	1.9	1.9	8.9	10.1	9.9	10.1
20–24	8.1	8.2	8.2	8.5	1.4	1.4	1.3	1.3	9.5	9.6	9.8	10.0
25–29	8.0	7.9	7.9	8.0	1.0	1.1	1.2	1.2	9.0	8.9	9.2	9.6
30–34	7.0	7.0	7.0	7.0	1.0	1.0	1.0	1.0	7.9	8.0	8.0	8.3
35–39	6.3	6.7	6.7	6.5	1.0	1.1	1.1	1.1	7.3	7.8	7.6	7.9
40 and over	7.4	7.2	7.2	6.6	1.4	1.2	1.5	1.5	8.7	8.3	8.0	8.8
Type of birth												
Caesarean	6.2	6.1	5.8	5.7	1.1	1.1	1.2	1.3	7.3	7.2	6.9	7.0
Vaginal	7.8	8.0	8.2	8.6	1.1	1.2	1.2	1.3	8.9	9.2	9.3	9.8

Notes

1. Transfusion includes the use of blood, blood products and plasma expanders.
2. There can be more than one type of PPH diagnosis in a maternity episode.

Source: AIHW National Hospital Morbidity Database.

- Overall, for 2008–2011 combined, there was marked variability across jurisdictions in maternity episodes with third-stage and immediate PPH. Proportions varied from 6.6% in Queensland to 14.6% in the Northern Territory, with the range of variation being higher in the non-transfused group. If the Northern Territory is excluded due to its unique demographics, the variation for all episodes (transfused and not transfused) is from 6.6%% to 11.2% (Table 2.9).
- PPH shortly after birth is more common in maternity episodes reported from public hospitals (10.3%) compared with private hospitals (4.3%) for the 2008–2011 period. Trends over time suggest that rates have remained stable in both public and private hospitals.

- Younger women (less than 24) have higher rates of PPH shortly after birth than older women (30–39), for PPH with and without transfusion. Maternal age differences most likely reflect differences in the method of birth and hospital sector.
- PPH shortly after birth does not appear to be diagnosed as commonly in maternity episodes where the birth was by caesarean. PPH is not the same as intrapartum blood loss, which varies markedly between vaginal and caesarean birth. Reliable assessment of third-stage haemorrhage in caesarean birth may be limited, as this would be difficult to distinguish from operative blood loss.

Quality of data

- The number of maternity episodes identified in the NHMD aligns closely with the number of mothers in the NPDC data.
- Although data from the NHMD show less variability than NPDC data, there is still substantial variation in rates across jurisdictions, with two-fold differences being observed overall, and for third-stage and immediate PPH associated with a transfusion. The smaller difference in rates with the NHMD most likely reflects the use of a common coding standard used for data submitted to the NHMD.
- The data from the NHMD are limited as there is no information on severity, although transfusion can be used as a crude measure. In addition, the 'immediate' PPHs are (by exclusion) up to 48 hours so do not correspond to the 24 hours definition in the indicator.
- Although data in the NHMD are based on the ACS, those standards do not include a definition of PPH, and how the coding is done in practice relies on the quality of the record-keeping, which can differ markedly.
- NPDC data are currently very poor due to marked differences in definitions and collection methods, but NMDDP work should assist to standardise collection.

Feasibility of standardising existing data sources

As outlined above there is currently significant variation in practice across jurisdictions in how they define and collect PPH. Based on the recommendations of the CDRG, the NMDDP has developed data items to support the national collection and reporting of primary PPH against a national standard. These include a flag for whether primary postpartum haemorrhage occurred, a flag for whether a blood transfusion occurred and a volume measure that records the mL of blood loss using a categorical field (500–999 mL, 1,000–1,499 mL and 1,500 mL or more). These data items have been incorporated in the Perinatal DSS; however, timeframes for the implementation of these national standards in the NPDC have not been agreed.

Recommendations for next steps

- The NPDC still remains the best option for reporting against this indicator, particularly as the NPDC has the capacity to identify the severity of PPH, and this information can be used in conjunction with other information, such as duration of pregnancy, that are not available from the NHMD.
- Development of the data items to support the national collection and reporting of primary PPH as part of the NMDDP is monitored to inform the timeframe for reporting against this indicator. This work is currently underway and data items have been incorporated into the Perinatal DSS. Work to include them within the NMDS is continuing.
- Data are reported for this indicator on an annual basis when available and be accompanied by clinical commentary.

2.1.4: Indicator 15: Women having their second birth vaginally whose first birth was by caesarean section

During discussions, ECG members recommended that for clarity the title for Indicator 15 be altered from 'Women delivering vaginally who have had one baby by caesarean section previously and no other pregnancies of more than 20 weeks gestation' to 'Women having their second birth vaginally whose first birth was by caesarean section'. Members also recommended that only singleton second births should be included in the scope of this Indicator. The following technical specification incorporates these recommendations.

15. Women having their second birth vaginally whose first birth was by caesarean section

Indicator details

Description	The proportion of women having their second birth vaginally whose first birth was by caesarean section.
Purpose	This indicator is used to benchmark practice for vaginal birth following caesarean section.
Numerator	The number of women having their second birth vaginally whose first birth was by caesarean section.
Denominator	The number of women having their second birth whose first birth was by caesarean section.
Computation/Presentation	Numerator/denominator x 100
Presentation	Percentage
Notes and exceptions	A birth is defined as the event in which a baby comes out of the uterus after a pregnancy of at least 20 weeks gestation or weighing 400 grams or more. Women included are those who are having a singleton for their second birth and whose first birth was by caesarean section. Women excluded are those whose second birth is a multiple birth, those who are not having their second birth, and those who are having their second birth and whose first birth was a vaginal delivery.

Data collection details

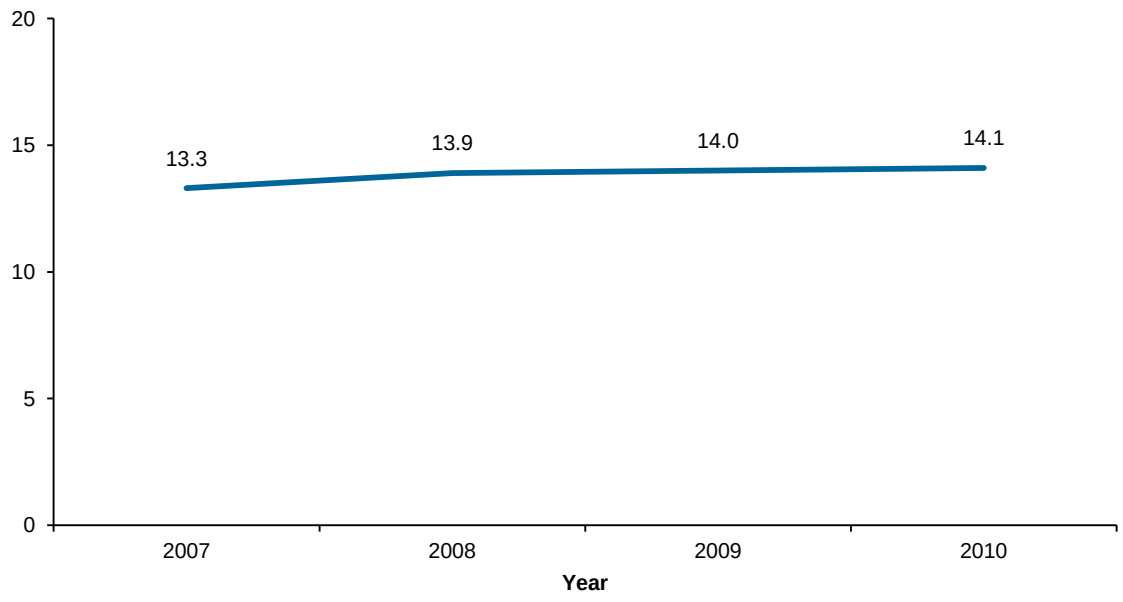
Data source	National Perinatal Data Collection
Data source type	Perinatal NMDS and voluntarily-supplied items
Data items—indicator	Parity Method of birth Caesarean section indicator (last previous birth) (item under development)
Data items—disaggregation factors	Year of birth State or territory of birth Hospital annual number of births

	Hospital sector Remoteness category (from mother's area of usual residence) Indigenous status of mother Indigenous status of baby
Frequency of data source collection(s)	Annual
Additional details	
Comments	Source of definition: Modified from ACHS indicator 2.1; WHA indicator 2a.

Based on the technical specification, analysis of the NPDC was undertaken to inform the development of this indicator.

Data analysis and results

- In 2007–2010, 13.8% of mothers giving birth for the second time with a history of caesarean section had a vaginal birth.
- Over the four years there was a marginal but progressive increase in the rate of vaginal birth following caesarean section among women giving birth for the second time, from 13.3% in 2007 to 14.1% in 2010 (Figure 2.7). This increase is statistically significant.



Notes

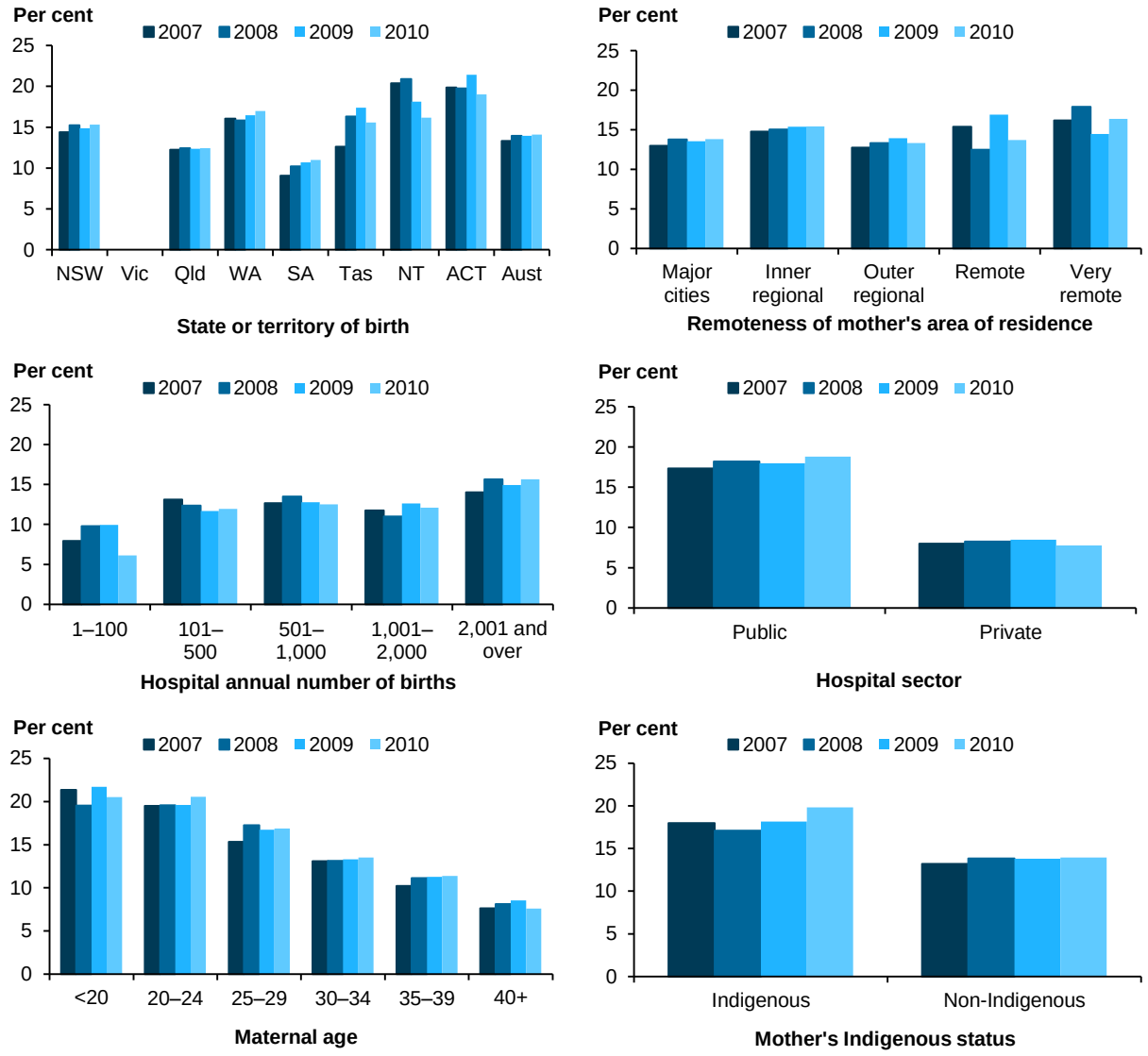
1. Data collection for vaginal birth following caesarean was not standardised during the reference period.
2. Data on previous caesarean birth was not available for Victoria during the reference period.

Source: AIHW National Perinatal Data Collection.

Figure 2.7: Women having their second birth vaginally whose first birth was by caesarean section, 2007–2010

- Over 2007–2010, there were differences among states and territories in vaginal birth rate following caesarean section for women giving birth for the second time. These ranged from 10.3% in South Australia to 20.0% in the Australian Capital Territory (Figure 2.8).

- There was no substantial difference by remoteness of the mother's area of residence in the proportion of women giving birth for the second time who had a vaginal birth following caesarean section (Figure 2.8).
- There was a marked difference by hospital sector. The vaginal birth rate following caesarean section was 18.1% among women giving birth for the second time in a public hospital, compared with 8.1% among women giving birth for the second time in a private hospital (Figure 2.8).



Notes

1. Data collection for vaginal birth following caesarean was not standardised during the reference period.
2. Data on previous caesarean birth was not available for Victoria during the reference period.
3. Remoteness was assigned using the ABS Australian Standard Geographical Classification remoteness structure applied to Statistical Local Area or postal area of mother's area of usual residence.

Source: AIHW National Perinatal Data Collection.

Figure 2.8: Women having their second birth vaginally whose first birth was by caesarean section, by selected characteristics, 2007–2010

- The proportion of women giving birth for the second time who had a vaginal birth following caesarean section declined with advancing women's age, with rates ranging from 20.8% for women aged 20 or younger to 8.0% for women aged 40 or older (Figure 2.8).
- Indigenous mothers giving birth for the second time with a history of caesarean section were more likely than non-Indigenous mothers to have a vaginal birth (18.0% and 13.2% respectively) (Figure 2.8).

Quality of data

- With the exception of *Method of birth,* data collection for vaginal birth following caesarean section was not standardised for the items required for deriving this indicator during the reference period, for the following reasons:
  - Data collection for determining if the woman was having their second child was not standardised. Some jurisdictions used *Parity*, which was defined as the total number of previous pregnancies experienced by the woman that have resulted in a live birth or a stillbirth. However, some jurisdictions (such as Western Australia) used other data items to determine if a woman who is currently pregnant has had no previous infants born.
  - In this analysis, *Caesarean section for last birth* was defined as whether a caesarean section was performed for the woman's last birth. Only New South Wales, Victoria and South Australia have definitions for this term, and these appear to conform to the definition in METeOR.

Feasibility of standardising existing data sources

National standards for *Caesarean section indicator (last previous birth)* and *Parity* have recently been added to the Perinatal NMDS and will be collected from 2014–15.

Recommendations for next steps

- Data currently available for this indicator are considered to be of sufficient quality for reporting purposes. It is recommended that this indicator be added to the set of NCMIs for reporting and be accompanied by clinical commentary. When reporting against this indicator it will be important to be clear about the purpose of the indicator and for the analysis to be presented together with caesarean section and morbidity rates.

2.1.5 Indicator 18: Caesarean sections <39 completed weeks (273 days) without obstetric/medical indication

This indicator was considered by ECG members, as well as by key experts and stakeholders engaged via a consultation process. A number of issues were considered in relation to this indicator, including:

- the title and purpose of the indicator
- rationale and evidence to support the indicator
- measurement issues, including how to identify whether pre-term delivery was conducted without any medical or obstetric indications, and data collection options.

Details of these issues are outlined below.

Purpose of the indicator

Neonatal respiratory morbidity can be reduced by minimising early delivery. This indicator is used to benchmark practice.

Evidence and rationale for the indicator

Babies born at late pre-term (between 34 0/7 and 36 6/7 weeks of gestation) and early-term (between 37 0/7 and 38 6/7 weeks of gestation) are at increased risk of adverse health outcomes, largely due to increased risk of respiratory morbidity (Morrison et al. 1995; Hansen et al. 2008; Hibbard et al. 2010), including increased likelihood of ventilator use (Madar et al. 1999) and increased admission to neonatal intensive care (Clark et al. 2009). The risk is higher at 37 than 38 completed weeks of gestation, which has a higher risk than 39 completed weeks of gestation (Hansen et al. 2009; Morrison et al. 1995).

Studies have also shown increased risk of poor neonatal outcome at 37 and 38 completed weeks compared with 39 completed weeks of gestation (Tita et al. 2009) and increased incidence of composite adverse neonatal outcome for infants born at late pre-term and early-term (34 0/6 to 38 6/7) compared with infants born at 39 0/7 to 40 6/7 weeks of gestation, even in the presence of a positive fetal lung maturity result (Kamath et al. 2011).

In addition to increased neonatal morbidity, increases in neonatal mortality have also been reported for babies born early-term compared with those born at 39 0/7 to 41 6/7 weeks of gestation. Neonatal mortality for babies born at 37 weeks or more was highest at 37 and lowest at 40 completed weeks of gestation (Reddy et al. 2011).

One study showed that elective caesarean delivery at 37 or 38 completed weeks of gestation did not improve adverse maternal outcomes compared with delivery at 39 completed weeks of gestation (Tita et al. 2011). Additionally, early elective delivery was associated with a two-fold increased frequency of maternal hospitalisation for 5 days or more, and this appeared to be more attributable to prolonged neonatal hospitalisation rather than increased maternal morbidity (Tita et al. 2011).

Although there is strong evidence for adverse neonatal outcomes as a result of early-term delivery, several studies have reported high rates of planned deliveries (either induction of labour or caesarean delivery) prior to 39 completed weeks of gestation. A large multicentre study in the US found that more than one-third of elective repeat caesarean deliveries at term were performed before 39 weeks of gestation (Tita et al. 2009). Similarly, between 1992 and 2002 in the US, the proportion of births classified as occurring by medical intervention increased from 28.9% in 1992 to 33.9% in 1997, and 41% in 2002. For medical intervention births, a larger proportion of infants in 2002 were born at earlier gestational ages than in 1992, with the mean gestational age decreasing from 39.2 weeks to 38.8 weeks (Davidoff et al. 2006). In England, elective caesarean rates have increased from 5% of all births in 1990 to 10% in 2008 (Gurol-Urganci et al. 2011).

A similar trend was seen in New South Wales, with the rate of planned birth (either caesarean or induction of labour) before the due date increasing between 2001 (19.2%) and 2009 (26.2%). The rate of pre-labour caesarean section increased over the same time period from 10.3% to 14.9% of all live births at 33 or more weeks of gestation (Morris et al. 2012). The rate of caesarean sections has been increasing in Australia, from 25.4% in 2001 to 31.6% in 2010 (Li et al. 2012). Caesarean section rates are higher in older mothers, with 40.3% of women aged 35–39 having a caesarean section and 48.0% of women aged 40 and over (Li et al. 2012). Of the women who gave birth by caesarean section without labour, 60.3% delivered at a gestational age of less than 39 completed weeks (Li et al. 2012).

There are varying opinions expressed in clinical guidelines and recommendations. Some recommend that planned caesarean section not be routinely carried out before 39 completed weeks of gestation (ACOG 2013; NICE 2011). Others recommend that the timing of elective or pre-labour caesarean section at term should be decided with consideration given to both maternal and neonatal factors (RANZCOG 2012).

Measurement issues

A concurrent AIHW and NPESU project, the NMDDP, is undertaking work on options to enhance nationally consistent and comprehensive maternal and perinatal data collection in Australia. A data item, *Indications for caesarean section,* has been prioritised by this project for data development and inclusion in a Perinatal DSS and eventually the Perinatal NMDS. The NMDDP established the CDRG to inform and make decisions on national standards for this and other data items. To maximise alignment between the NMDDP and NCMI projects information has been shared between the ECG and CDRG and has informed discussions and recommendations.

Following is a summary of the information and issues discussed by both groups, which largely focused on the measurement issues for this indicator:

- ECG members recommended that for clarity the title be altered to 'Caesarean sections <39 weeks (273 days) without obstetric/medical indication' and that the purpose of the indicator is to reduce neonatal respiratory morbidity by minimising early delivery.
- The *Indications for caesarean section* item under development as part of the NMDDP is relevant to caesarean delivery at any gestation, not specific for deliveries prior to 39 completed weeks, so would need to be modified to apply to pre-term babies.
- Measurement of this indicator requires data on method of delivery and gestational age, which are available in the NPDC, and data on whether the early delivery was conducted without any medical or obstetric indications, which are not currently available. Currently, some data on maternal morbidities and reasons for caesarean section are available in state and territory perinatal data collections, although there are no consistent data available at the national level.
- The CDRG developed a list of indications for caesarean section, which was considered by the ECG to inform discussion of this indicator in relation to the identification of those indications that would justify a pre-term caesarean section, that is, those indications that would be excluded from the analysis for this NCMI.
- Table 2.10 provides the list of indications developed by the CDRG that is now included in the Perinatal DSS.
- During consultation, it was proposed to the ECG that in the absence of labour, codes 03, 11, 15, 16, 17 and 20 could provide the basis on which analysis for this indicator could be done in the future, and in the presence of labour, code 20 could provide the basis for analysis. However it was noted that:
  - Codes 03, 11, 15, 16 and 17 (see Table 2.10) will not always be inappropriate before labour and should be applied only when there is no documentation to support informed decision-making. However this is not likely to be possible and, in that case, only code 20 should apply.
  - Distinguishing between labour and non-labour is best left as a separate item to add context when analysed in conjunction with other information on the indication for the caesarean section.

- Although the recommendation for gestation of an elective caesarean section is 'approximately 39 weeks' gestation', because of hospital scheduling issues, it is very common that an elective caesarean section would be done at any time from 38.4 to 39.3 weeks' gestation.
- The following indicators for possible early delivery were used as exclusions for an audit for caesarean section performed prior to 39 weeks in singleton pregnancies in Western Australia—pre-eclampsia, pre-existing hypertension, APH/ placenta praevia, SROM, and pre-existing and gestational diabetes.

Table 2.10: List of codes for *Indications for caesarean section* NMDDP data item

Code	Description
01	Fetal compromise
02	Suspected fetal macrosomia
03	Malpresentation
04	Lack of progress; less than or equal to 3 cm cervical dilatation
05	Lack of progress in the first stage; 4 cm to less than 10 cm cervical dilatation
06	Lack of progress in the second stage
07	Placenta praevia
08	Placental abruption
09	Vasa praevia
10	Antepartum/intrapartum haemorrhage
11	Multiple pregnancy
12	Unsuccessful attempt at assisted delivery
13	Unsuccessful induction
14	Cord prolapse
15	Previous caesarean section
16	Previous shoulder dystocia
17	Previous perineal trauma/4th degree tear
18	Previous adverse fetal/neonatal outcome
19	Other obstetric, medical, surgical, psychological indications
20	Maternal choice in the absence of any obstetric, medical, surgical, psychological indications
99	Not stated/inadequately described

Internationally, lists of indications that may justify early delivery exist in a range of contexts—performance indicator measurement, specialist medical college committee opinion, and research studies. The US Joint Commission (2012) has developed a set of 5 perinatal care measures, including 1 measure of elective deliveries at ≥ 37 and < 39 completed weeks of gestation. This measure includes both elective vaginal deliveries and elective caesarean sections in the absence of obstetric/medical indication. The conditions justifying elective delivery prior to 39 completed weeks' gestation are given as ICD-9-CM codes (see Table D1 in Appendix D). The US Joint Commission chose to use ICD-9 codes so that the measure was not overly labour-intensive to collect (Main et al. 2010). It should be noted that the rate of this indicator will never be zero, as the diagnosis-related group codes cannot capture all valid reasons for performing an early-term caesarean section (Clark et al. 2012).

The American College of Obstetricians and Gynecologists recently released Committee Opinion number 560 titled *Medically indicated late-preterm and early-term deliveries* (ACOG 2013). This paper includes a list of conditions that complicate pregnancy (see Table D2 in Appendix D), with suggested timing of delivery (late pre-term or early-term). The list is not meant to be all-inclusive, but includes indications commonly encountered in clinical practice.

A research study by Tita and others (2009) used a list to determine which caesarean deliveries were elective in their study population (see Figure 1 in Appendix D).

Options for data collection

Three options were suggested to support the collection of data for this indicator:

- Use of a comprehensive list of indications, such as one based on ICD-10-AM, similar to that used in the US Joint Commission (2012) indicator.
- Use of a list that covers the common indications, including those for pre-term delivery, based on the item currently under development as part of NMDDP for indications for caesarean section.
- Use of a flag for 'without medical or obstetric indications'. This could be achieved by using code 20 from the *Indications for caesarean section* item developed under the NMDDP. Although the NMDDP item allows for both a main and additional indications to be selected, the guide for use states that code 20 is for use on its own.

The benefits, issues and limitations of each option are outlined in Table 2.11.

Table 2.11: Summary of benefits and issues/limitations of data collection options

Data collection method	Benefits	Issues/limitations
Comprehensive list of indications	Detailed information on indication available. Disaggregation by indication possible.	Feasibility/practicality of implementing. Response burden.
List of common indications	Most common indications available. Disaggregation by indication possible. If using a subset of the list being developed for the NMDDP, then no additional data collection burden.	Does the proposed NMDDP list of indications for caesarean section cover appropriate indications for delivery prior to 39 completed weeks of gestation?
Flag for 'without medical or obstetric indications'	Minimal data collection burden.	Very limited information available. No disaggregation by indication possible.

Conclusions from initial scoping

The list of common indications appears to offer the most benefits with few limitations. The list of indications for caesarean section currently being developed by the NMDDP (see Table 2.10) includes many of the items found in the international lists (US Joint Commission 2012; ACOG 2013; Tita et al. 2009), but does not include maternal hypertension or diabetes. Separate items are being developed through the NMDDP to capture information in the perinatal data collection on maternal hypertension and diabetes, potentially allowing, in conjunction with other information, derivation of the reason for the pre-term delivery.

At their meeting in June 2013 the NMDDP Advisory Group considered the NMDDP item for indications for caesarean section and concluded that the list of indications was appropriate for use for pre-term deliveries, and that the addition of maternal morbidity conditions to the item was not required on the basis that these conditions are contributing/underlying factors, not the indication for a caesarean section.

Consultation outcomes

This indicator was further considered by key experts and stakeholders engaged via a consultation process. A summary of the results is provided below (further details are available in Appendix B).

Title

Around three-quarters of respondents (77%, n=17) agreed with the proposed title for this indicator: 'Caesarean sections <39 weeks (273 days) without obstetric/medical indication'. Other comments provided by respondents regarding the gestation period covered by the indicator were:

- elective caesarean section is 'approximately 39 weeks' gestation' (as recommended by RANZCOG), because of hospital scheduling issues
- it is very common that an elective caesarean section would be done at any time from 38.4 to 39.3 weeks, therefore the indicator should be less than 38.4 weeks gestation
- less than 39 completed weeks is simply wrong and encouraging bad practice.

Purpose

The majority of respondents (86%, 19 respondents) supported the proposed purpose of the indicator: 'Neonatal respiratory morbidity can be reduced by minimising early delivery. This indicator is used to benchmark practice'.

Additional comments provided by respondents on the purpose of this indicator included:

- data presented at FIGO from UK suggest that this presumption is not valid in a prospective study—not seen in print yet, but potentially important
- not simply respiratory morbidity that increases with decreasing gestational age, many organs undergo maturation shortly before natural birth—neonatal jaundice is another example
- suggest use 'birth' rather than 'delivery'
- also useful to note that this has to be balanced against the increased rates of death and disability by delaying the delivery, that is, 'approximately 39 weeks' achieves this balance.

Measurement issues

The most common preference to capture indications that may justify caesarean section delivery prior to 39 completed weeks' gestation was the 'List of common indications based on the NMDDP list of indications for caesarean section' (48%, 11 respondents). This was followed by the 'Comprehensive list of indications based on ICD-10-AM' (30%, 7 respondents) and the 'Flag for 'without medical or obstetric indication'' (22%, 5 respondents).

The most common theme in the comments received on the list of indications (Table 2.10) was regarding the distinction between pre-labour and labour. Several respondents felt that the labour indications do not apply to this indicator and should be excluded, as the indicator relates only to planned caesarean sections prior to 39 completed weeks gestation (rather than elective).

Remaining issues

The main issues arising from the consultation fall into two areas:

1. **Labour/no labour**—should this indicator be restricted (in the indicator wording) to cases where there is no labour? Several comments consistently made the point that the reasons for having a caesarean section before 39 weeks when a woman has already gone into labour are different to those where the caesarean section is an elective procedure before 39 weeks. The purpose of the indicator is to monitor, and reduce, the rate of unnecessary procedures that have been shown to potentially affect a baby's respiratory health.
2. **The definition of 'no obstetric/medical indication'**—while there is good support for use of a standardised list of the most common indications for caesarean section, such as the one developed for the NMDDP, there is debate whether selection by a clinician of code 20 *Maternal choice in the absence of any obstetric, medical, surgical, psychological indications* would sufficiently capture the number of caesarean sections for which there is inadequate justification where the birth was pre-term.

   Stakeholders suggested that other indications on the NMDDP list would need to be analysed in conjunction with code 20. Although there was not complete consensus, in general they noted that:

   - Where there is no labour, the following codes would not justify a pre-term or early-term caesarean section delivery:

     02 Suspected fetal macrosomia

     03 Malpresentation

     11 Multiple pregnancy

     15 Previous caesarean section

     16 Previous shoulder dystocia

     17 Previous perineal trauma/4th degree tear

     18 Previous adverse fetal/neonatal outcome.

   - The following codes would be irrelevant if the indicator was restricted to cases where there is no labour:

     04 Lack of progress; less than or equal to 3 cm cervical dilatation ≤ 3 cm

     05 Lack of progress in the first stage 4 cm to less than 10 cm cervical dilatation

     06 Lack of progress in the second stage

     12 Unsuccessful attempt at assisted delivery

     13 Unsuccessful induction

     14 Cord prolapse.

   - This would leave only the following codes in the list as adequate justification for pre-term or early-term caesarean section where there is no labour:

     01 Fetal compromise

     07 Placenta praevia

     08 Placental abruption

     09 Vasa praevia

10 Antepartum/intrapartum haemorrhage

19 Other obstetric, medical, surgical, psychological indications.

Related to the list of justifiable indications, and still unresolved, is the issue of whether certain maternal morbidities, such as hypertension and diabetes, are valid indications for a pre-term or early-term caesarean section, and should be added to the NMDDP list. There has been strong opinion that these should not be included in the NMDDP list as they are underlying conditions and not the reason for the actual caesarean section procedure. However there also seems to be opinion to the contrary.

In making a decision about this, alternative ways of capturing information on maternal morbidities should be considered such as the:

- analysis of other data in the NPDC on maternal morbidities
- selection of code 19 as an additional indication that maternal morbidities were believed to be associated with the need for the caesarean section—however, another relevant code from the list would still need to be selected as the main indication.

Can existing data help inform decisions around this indicator?

Data from the NPDC were analysed to inform the development of this indicator. Data quality varies by jurisdiction, and results should be interpreted with caution due to varying data completeness and data collection practices as follows:

- Data on main reason for caesarean were not available for Western Australia and the Australian Capital Territory for 2007–2010, and not available for Victoria for 2009 and 2010.
- In the NPDC, data on reasons for caesarean section are limited to the main reason for caesarean section.
- The range of categories for main reason for caesarean varies substantially among jurisdictions.

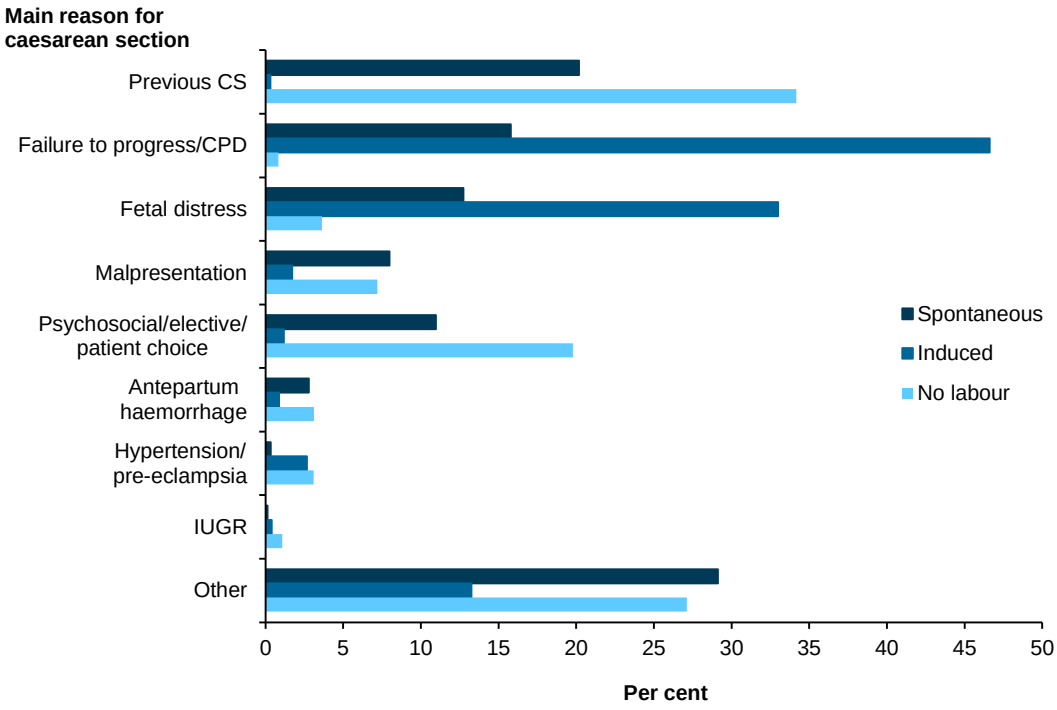
Figure 2.9 shows that, where there was no labour, *Previous caesarean section* was reported as the main reason for caesarean section in nearly 35% of these births. This should be considered with the information above about whether previous caesarean section is a justifiable reason for pre-term caesarean section. *Psychosocial/elective/patient choice*, *Other* and to some extent *Malpresentation* were the other main reasons for cases of no-labour caesarean section.

Table 2.12 shows the main reason for the caesarean section for women who had pre-term caesarean section deliveries where a maternal morbidity had also been reported in the perinatal data:

- For women who had pre-existing hypertension, the main reason for caesarean section was reported to be hypertension/pre-eclampsia in 20% of cases. Where the underlying medical condition was pregnancy-induced hypertension, this rose to nearly 50% of cases.
- Diabetes was not in the list of main reasons for caesarean section reported to the NPDC. For women who had pre-existing diabetes or gestational diabetes mellitus, *Other* was reported to be the main reason for caesarean section in 26% and 20% of cases respectively.
- There were high rates of reporting of *Previous caesarean section* as the main reason for caesarean section for all these women—of the selected maternal morbidities also

reported with this main reason, the lowest was 22% with pregnancy-induced hypertension, and highest was 52% with gestational diabetes.

Given the caveats on the data, it is difficult to say how well they can inform the discussion and decisions for this indicator. There is a strong case for standardisation of these data.



Note: Data quality varies by jurisdiction and results should be interpreted with caution due to varying data completeness and data collection practices.

Source: AIHW National Perinatal Data Collection.

Figure 2.9: Women with a singleton birth by caesarean section at less than 39 completed weeks (273 days) gestation, by onset of labour and main reason for caesarean, 2007–2010

Table 2.12: Women with selected maternal medical and obstetric conditions who gave birth to a singleton by caesarean section (where there was no labour) at less than 39 completed weeks (273 days) gestation, by main reason for caesarean section, 2007–2010 (per cent)

	Main reason for caesarean section										
Selected condition	Previous CS	Failure to progress/ CPD	Fetal distress	Malpresentation	Psychosocial/elective/ patient choice	Antepartum haemorrhage	Hypertension/ pre-eclampsia	IUGR	Other	Not stated	Total (incl. not stated)
Pre-existing hypertension	44.3	0.5	5.8	7.4	4.1	3.3	20.3	3.5	10.6	0.3	100.0
Pregnancy-induced hypertension	21.8	0.7	5.4	7.2	2.5	1.7	48.6	2.4	9.5	0.2	100.0
Pre-existing diabetes	42.6	1.0	8.3	6.4	2.8	1.4	9.6	1.7	26.2	0.1	100.0
Gestational diabetes	51.5	0.7	2.7	10.3	4.5	3.7	5.2	1.3	20.0	0.2	100.0
Epilepsy (before pregnancy)	52.8	0.3	5.3	9.9	4.3	3.1	5.0	2.8	16.1	0.3	100.0
Antepartum haemorrhage											
Placenta praevia	8.6	0.1	1.2	4.2	2.2	76.7	0.6	0.4	6.1	0.0	100.0
Abruptio placenta	7.1	0.3	10.4	2.1	2.1	70.1	2.1	0.5	5.3	0.0	100.0
Antepartum Haemorrhage (unspecified)	33.0	0.6	6.8	11.0	3.7	25.3	3.8	2.7	13.0	0.0	100.0
Placenta praevia & abruptio placenta	5.0	0.0	10.0	5.0	0.0	70.0	5.0	0.0	5.0	0.0	100.0
Any of above conditions	37.0	0.7	4.9	8.5	3.5	7.6	21.0	2.0	14.6	0.2	100.0
None of the above conditions	61.6	1.6	2.0	12.6	6.4	0.5	0.1	1.7	13.4	0.1	100.0

Notes

1. Data quality varies by jurisdiction, and results should be interpreted with caution due to varying data completeness and data collection practices.
2. Only includes data for Vic, Qld, SA, Tas, and NT. Data on main reason for caesarean birth was not available for Victoria for 2009 and 2010.

Source: AIHW NPDC.

Recommendations for next steps

- The indicator should be used only in 'no labour' cases.
- As justification for pre-term and early-term caesarean section and no labour, use the *Indications for caesarean section* item developed as part of the NMDDP, and the following codes:
  - 01 Fetal compromise
  - 07 Placenta praevia
  - 08 Placental abruption
  - 09 Vasa praevia
  - 10 Antepartum/intrapartum haemorrhage
  - 19 Other obstetric, medical, surgical, psychological indications.
- Certain maternal morbidities, such as hypertension and diabetes, do not need to be captured in the *Indications for caesarean section* data item, on the basis that they are underlying conditions and not the reason for the actual caesarean section procedure.
- This indicator be added to the set of NCMIs for reporting and be accompanied by clinical commentary.

2.2 Indicators requiring scoping and development

The indicators in this section required extensive scoping and consultation on the most appropriate developmental pathway. Evidence to support each indicator was obtained through literature review, and scoping of existing definitions and clinical criteria/guidelines, both national and international, was undertaken. The purpose of each indicator was initially based on the evidence obtained and discussions of the ECG, then further refined through wider consultation. Advice was sought from the ECG and via the consultation on definitional and measurement issues, including potential data sources. Findings for each indicator are outlined below.

2.2.1 Indicator 11: High risk women undergoing caesarean section who receive appropriate pharmacological thromboprophylaxis

This indicator was considered by ECG members, as well as by key experts and stakeholders engaged through a consultation process.

The main issues were:

- purpose, including whether the existing rationale for the ACHS indicator was appropriate or adaptable, and difficulties associated with identifying improved outcomes
- rationale and evidence to support the indicator, including whether, despite the lack of evidence, the indicator is still considered to be critical
- definitional and measurement issues, including how to define high risk and appropriate pharmacological thromboprophylaxis.

Purpose of the indicator

There is an existing Australian Council on Healthcare Standards (ACHS) indicator that includes the following statements, and which were proposed for use in this NCMI (Indicator 11):

- Thromboembolism is a major cause of maternal morbidity. Pregnancy is a risk factor for venous thromboembolism and the risk is higher if birth is by caesarean section, especially

emergency (non-elective) caesarean section. A fall in deaths from venous thromboembolism after caesarean section was observed in the UK after introduction of the Royal College of Obstetricians and Gynaecologists guidelines for thromboprophylaxis in 1995.

- These guidelines are consensus guidelines as there is a paucity of adequately conducted trials on which to base recommendations.
- The rate for this indicator will not be 100% as there will be some women where the clinician does not deem it appropriate for the patient to receive pharmacological thromboprophylaxis (ACHS 2013a).

The latest available ACHS report includes information on desirable level and type of indicator (Table 2.13) which are important components to consider in developing Indicator 11. The rate of health-care organisations providing appropriate pharmacological thromboprophylaxis to high-risk women undergoing caesarean section increased from 62% in 2008 to 82% in 2012.

Table 2.13: Findings for ACHS indicator on pharmacological thromboprophylaxis and caesarean section, 2008–2012

Numerator	Number of high-risk women undergoing caesarean section who receive appropriate pharmacological thromboprophylaxis								
Denominator	Number of high-risk women undergoing caesarean section								
Desirable level:		☐ Low		☑ **High**			☐ Not specified		
Type of indicator:		☑ **Process**		☐ Outcome			☐ Structure		
Year	**No. HCOs**[(a)]	**Total numerator**	**Total denominator**	**Rate**[(b)]	**Rate**[(b)] **(20th centile)**	**Rate**[(b)] **(80th centile)**	**Centile gains**[(c)]	**Stratum gains**[(d)]	**Outlier gains**[(e)]
2008	40	1,049	1,698	61.8	19.1	85.6	405	309	217
2009	56	1,456	2,814	51.7	26.4	88.7	1,039	849	378
2010	57	2,230	3,545	62.9	36.8	88.7	914	574	408
2011	70	3,145	4,295	73.2	50.1	93.0	848	–	293
2012	69	3,358	4,083	82.2	66.9	95.7	549	374	240

(a) HCOs = health-care organisations.

(b) per 100 caesareans.

(c) Centile gains show the number of units that would benefit if the overall level of performance achieved by all organisations combined was the same as that of the better performing 20% of organisations (as defined by the 80th centile rate).

(d) Stratum gains show the number of units that would benefit if the performance of organisations outside the better performing stratum was lifted to that level. Strata can only be considered for these comparisons when there are sufficient data (at least five organisations contributing to each stratum). Stratum differences may represent the contrast between either metropolitan or non-metropolitan organisations, between any single jurisdiction and the others, or between organisations belonging to the public and private sectors. Only the largest stratum gain is recorded in this table.

(e) Outlier gains show the number of units that would benefit if those organisations with results that are more than three standard deviations poorer than average could achieve the average level of performance.

Source: ACHS 2013b.

Venous thromboembolism (VTE) is a rare cause of death in pregnancy, causing 14 (15%) direct maternal deaths in Australia over the period 1997–2005 (Sullivan et al. 2008). It may be difficult to detect improved outcomes for this indicator, as apparently significant changes in the number of maternal deaths due to VTE may be due to random variation. It should also be noted that increased morbidity has been recorded, due to increased risk of bleeding and wound complications, when using pharmacologic thromboprophylaxis (Tooher et al. 2010). Neither maternal deaths nor morbidity are captured within the set of NCMIs.

Evidence and rationale for the indicator

A recent Cochrane review concluded that there is insufficient evidence available from randomised controlled trials (RCTs) on which to base recommendations for thromboprophylaxis during pregnancy and the early postnatal period, and that in the absence of clear RCT evidence, practitioners must rely on consensus-derived clinical practice guidelines (Tooher et al. 2010). Despite limited evidence to support the use of thromboprophylaxis following caesarean section, clinical guidelines recommend its use in women with additional risk factors (Bates et al. 2008). Further information on clinical guidelines is given in 'Definitional and measurement issues' below.

Factors that increase the risk of venous thromboembolism after a caesarean section include older maternal age, prior venous thromboembolism, obesity, thrombophilia, immobilisation, lower limb paralysis, pre-eclampsia, medical comorbidities and surgery during pregnancy or the puerperium (RCOG 2009; Bates et al. 2008; Tooher et al. 2010).

Definitional and measurement issues

The following components of this Indicator need to be defined:

- high VTE risk women
- appropriate pharmacological thromboprophylaxis.

High VTE risk women

There are a number of risk factors for VTE in pregnancy as outlined earlier. For the purpose of this Indicator, what constitutes high risk must be established, which will include consideration of whether there is a minimum number of risk factors that must be present from a selection of risk factors, or whether a predetermined list of risk factors must always be present.

Table 2.14 outlines the risk factors common across the sets of clinical guidelines examined, and can be used as the basis for determining what is critical for this Indicator. Shaded cells indicate consistency across all guidelines.

Table 2.14: Mapping of risk factors for VTE during pregnancy relevant to caesarean section across guidelines

	ACHS	UK RCOG	Qld	SA[a]	WA[b]	Vic[c]	NSW[d]
High risk factors							
Extended major pelvic or abdominal surgery (caesarean hysterectomy)[e]	✓	? Surgical procedure in pregnancy or puerperium	✓	✓	✓ Recent surgical procedures, but especially abdominal and pelvic surgery	✓	✓
Family or personal history of deep vein thrombosis (DVT); pulmonary embolism (PE) or thrombophilia (including antiphospholipid syndrome); paralysis of lower limbs[e]	✓	✓	✓	✓	✓ Separate risk factors of 'previous VTE', 'lower limb paralysis' and 'inherited or acquired thrombophilias'	✓	? Family history of thromboembolism in a first degree relative is a moderate risk factor; includes varicose veins with phlebitis; does not include lower limb paralysis
Moderate risk factors							
Age > 35[e]	✓	✓	✓	✓	✓	✓	✓ Age ≥35
Initial weight > 80kg[e]	✓	✓ BMI>30	✓ or BMI>30	✓ BMI>30 (major risk factor)	✓ BMI>30	✓ BMI>30	✓ BMI ≥30
Parity of 4 or more	✓	✓ Parity ≥3	✓	✓	X	✓	X
Gross varicose veins[e]	✓	✓	✓	✓	✓	✓	✓

(continued)

Table 2.14 (continued): Mapping of risk factors for VTE during pregnancy relevant to caesarean section across guidelines

	ACHS	UK RCOG	Qld	SA[a]	WA[b]	Vic[c]	NSW[d]
Current infection	✓	✓ Systemic infection	✓	See 'Major current illness'	See 'Major current illness'	✓	See 'Major current illness'
Pre-eclampsia[e]	✓	✓	✓	✓ Major risk factor	✓	✓	✓
Immobility prior to surgery (>4 days)[e]	✓	✓ ≥3 days	✓	✓ Includes paraplegia (major risk factor)	✓ Prolonged or severe, but no time frames given. Includes prolonged travel	✓	✓ No time frame given
Major current illness (heart or lung disease, cancer, inflammatory bowel, nephritic syndrome, recent surgery in pregnancy)[e]	✓	✓ Also SLE, inflammatory conditions, sickle cell disease, intravenous drug user	✓ Also sickle cell disease	✓ Medical co-morbidity (inflammatory, infective or malignant) (major risk factor)	✓ Acute medical illness (for example severe infection, maternal heart or respiratory disease). 'Active or occult malignancy' is a separate risk factor	✓ 'Nephrotic syndrome, sickle cell disease' is a separate risk factor	? 'Admission to acute care' is a moderate risk factor

(continued)

Table 2.14 (continued): Mapping of risk factors for VTE during pregnancy relevant to caesarean section across guidelines

	ACHS	UK RCOG	Qld	SA[a]	WA[b]	Vic[c]	NSW[d]
Other risk factors							
Smoking		✓		✓			
Multiple pregnancy		✓			✓		
Assisted reproductive therapy		✓					
Prolonged labour (>24 hours)		✓	✓ ≥12 hours	✓			
Hyperemesis, dehydration		✓	✓				✓ Hyperemesis gravidarum
Long-distance travel (>4 hours)		✓			✓ Prolonged travel part of immobility		

(a) Thromboprophylaxis considered for: emergency caesarean section; 2 or more major risk factors; 1 major and 2 or more minor risk factors.

(b) King Edward Memorial Hospital guidelines (KEMH 2010). These do not state the number of risk factors that place a woman at increased risk of VTE and therefore treatment with thromboprophylaxis.

(c) Royal Women's Hospital guidelines (2013a).

(d) Royal Hospital for Women guidelines (2011). High risk is defined as 2 or more moderate risk factors or 1 high risk factor.

(e) Consensus across all guidelines.

Notes

1. Women at high risk of VTE are those with 3 or more moderate risk factors or 1 high risk factor unless otherwise stated.
2. BMI = Body Mass Index (weight in kg/(height in m)2).

Appropriate pharmacological thromboprophylaxis

The following guidelines exist in relation to the use of pharmacological thromboprophylaxis to prevent VTE in pregnancy:

- The National Health and Medical Research Council's *Clinical practice guideline for the prevention of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients admitted to Australian hospitals* (2009) notes the lack of formal evidence to guide recommendations regarding prevention of VTE in pregnancy and the early postnatal period for women admitted to hospital. The document includes steps for undertaking a VTE risk assessment that incorporates an assessment of individual patient risk factors, risks related to an acute medical illness, risks related to an injury or surgical procedure, and the bleeding risk (NHMRC 2009). Section 5.5 on pregnancy and childbirth within this document makes the following recommendations for pharmacological thromboprophylaxis based on consensus, and graded as Good Practice Points:
  - where pharmacological thromboprophylaxis is appropriate and not contraindicated, use low molecular weight heparin after caesarean delivery for five to seven days or until the patient is fully mobile
  - extend pharmacological thromboprophylaxis with low molecular weight heparin or adjusted therapeutic dose warfarin for six weeks for high-risk women, after caesarean or vaginal delivery.
- RANZCOG has not published any guidelines on thromboprophylaxis in the puerperium; however, the College has endorsed the position statement 'Anticoagulation in pregnancy and the puerperium' published by Hague and others (2001). This position statement recommends the use of low molecular weight heparin or unfractionated heparin for at least 5 days postpartum in women at high risk of VTE.
- The Society of Obstetric Medicine of Australia and New Zealand (SOMANZ) has endorsed the recommendations of a group of experts that women at high risk of VTE receive low molecular weight heparin or unfractionated heparin for at least 5 days postpartum (McLintock et al. 2012).
- Guidelines used in Queensland, South Australia, Western Australia, Victoria and New South Wales recommend the use of low molecular weight heparin for thromboprophylaxis after caesarean section in high-risk women, unless contraindicated.
- The ACHS indicator on pharmacological thromboprophylaxis and caesarean section refers to 'prophylaxis that is concordant with the recommendations in locally agreed guidelines which have been endorsed by the Drugs and Therapeutics Committee or other appropriate committee' (ACHS 2013a).

Table 2.15 provides an overall picture of what various guidelines state in relation to the use of pharmacologic thromboprophylaxis to prevent VTE in pregnancy. Shaded cells indicate consistency across all guidelines. All guidelines recommend low molecular weight heparin (LMWH), with some also including unfractionated heparin (UH). However, there are variations among the guidelines in relation to timing of the first dose, removal of epidural when LMWH is used, and minimum treatment length.

Table 2.15: Mapping of guidelines in relation to the use of pharmacologic thromboprophylaxis to prevent VTE in pregnancy

	NHMRC (2009)	UK RCOG (2009)	RANZCOG-endorsed[a] (2001)	SOMANZ-endorsed[b] (2012)	State guidelines
Recommended pharmacologic agent[c]	LMWH	LMWH	LMWH or UH	LMWH or UH	LMWH or UH
Timing of first dose—no epidural or removed shortly after delivery	ASAP >4 hrs after delivery/epidural removal	By 4 hrs after delivery/epidural removal			Within 6 hrs of delivery (Qld) 6–8 hrs after delivery (SA) At least 4 hrs after delivery (WA) No sooner than 4 hrs, no later than 24 hrs after delivery (Vic)
Timing of first dose—epidural left in place for postpartum analgesia	No sooner than 2 hrs after epidural removal and no sooner than 10 hrs after a previously administered dose				At least 4 hrs after epidural removal (SA)
Removal of epidural when LMWH is used		No sooner than 12 hrs after a previously administered dose and at least 4 hrs before the next dose	No sooner than 12hrs after a previously administered dose and at least 4 hrs before the next dose	No sooner than 12hrs after a previously administered dose and at least 2 hrs before the next dose	No sooner than 12 hrs after a previously administered dose and at least 2 hrs before the next dose (Qld, SA, NSW, NSW) No sooner than 12 hrs after a previously administered dose and at least 2 hrs, but preferably 4 hrs, before the next dose (WA)
Minimum treatment length	5–7 days	7 days	5 days	5 days	4 days (Vic) 5 days (Qld, SA) 5–7 days (WA)

(continued)

Table 2.15 (continued): Mapping of guidelines in relation to the use of pharmacologic thromboprophylaxis to prevent VTE in pregnancy

	NHMRC (2009)	UK RCOG (2009)	RANZCOG-endorsed[a] (2001)	SOMANZ-endorsed[b] (2012)	State guidelines
Dosage (prophylactic dose for women 50–90 kg)					
Enoxaparin[c]		40 mg daily	40 mg daily	40 mg daily	40 mg daily (Qld, SA, WA)
Dalteparin[c]		5,000 IU daily	5,000 IU daily	5,000 IU daily	5,000 IU daily (SA, Vic)
Tinzaparin		4,500 IU daily		4,500 IU daily	
UH				5,000 IU twice daily	5,000 IU twice daily (Qld, NSW)

(a) Hague et al. 2001. Anticoagulation in pregnancy and the puerperium.

(b) McLintock et al. 2012. Recommendations for the prevention of pregnancy-associated venous thromboembolism.

(c) Consensus across all guidelines.

Note: Shaded cells show consensus across all guidelines.

Consultation outcomes

The ECG concluded that:

- there is a lack of consensus on the definition of high risk women and that it may not be feasible to reach consensus
- there is considerable variation in practice for thromboprophylaxis after caesarean section
- it is unclear what the appropriate rate for this indicator would be; however, it would be less than 100%, as clinicians will consider thromboprophylaxis inappropriate for some women
- the rate may only be around 50–60% and not vary over time, therefore the value of collecting this indicator was questioned
- based on these issues, the ECG recommended that further development of this indicator not be pursued at this time.

The majority of experts and stakeholders surveyed through the further consultation process (83%, 19 respondents) agreed with the recommendation that further development of this Indicator not be pursued at this stage. Four respondents (17%) did not agree, and provided responses to subsequent open-ended questions around definitional and measurement issues (see to Appendix B for details).

Recommendations for next steps

- It is recommended that further development of this indicator not be progressed.

2.2.2 Indicator 16: Separation of baby from the mother after birth for additional care

This indicator was considered by ECG members, as well as by key experts and stakeholders engaged through a consultation process. The main issues were:

- purpose, including what is the most appropriate focus for the indicator
- rationale and evidence to support the indicator, including the importance of mother and baby attachment, contributed to by rooming-in and breastfeeding
- definitional and measurement issues, including how to define 'separation', 'after birth' and 'additional care'.

Purpose of the indicator

The purpose of this indicator is to measure the separation of mother and healthy baby in the first 24 hours after birth, with the aim of minimising separation and enhancing mother–baby attachment.

Evidence and rationale for the indicator

The evidence supports that reducing the separation of mothers and babies enhances attachment and promotes breastfeeding.

Closeness is the first step in facilitating attachment between the mother and baby, and also promotes maternal confidence. This proximity needs to start at birth. Frequent time together between mothers and babies enables mothers to learn and recognise their baby's needs, establishing a connection that lasts a lifetime (Crenshaw 2007). When mother and baby are

separated, this process is interrupted for them both (Dumas et al. 2013), and regardless of whether the separation time is limited or delayed, it may have a harmful effect on their relationship (Enkin et al. 2000).

Research to study the influence of birth routine on mother–infant interactions showed that mothers who were separated from their babies for the first two hours after birth, and then experienced rooming-in, showed a similar behaviour pattern to mothers who were separated and whose babies remained in a nursery. These mothers were rougher with their babies during a breastfeeding session than mothers who experienced skin-to-skin contact after birth followed by rooming-in (Dumas et al. 2013). The study concluded that immediate and uninterrupted skin-to-skin contact at birth, and rooming-in during postpartum, be encouraged, as recommended in the World Health Organization/UNICEF document *Ten steps for successful breastfeeding.*

Although standard hospital practices have changed from those described by Barnett et al. (1970) and no longer involve routine separation of mother and baby, babies with additional care needs (such as admission to a neonatal intensive care unit) may be separated from their mothers. When efforts are made to include parents in the care of their babies, parents feel closer to their baby and have a more positive experience (Flacking et al. 2012; Erlandsson & Fagerberg 2005).

Separation of the baby from the mother after a caesarean birth is more common than after a vaginal birth, with mothers often recovering in a separate room from their baby. A pilot study to minimise maternal–infant separation after caesarean section found that infants remaining in the operating room had no detrimental effect on infant thermoregulation and in some cases, thermoregulation was improved compared with controls (Nolan & Lawrence 2009). However, providing skin-to-skin contact can be more challenging after delivery by caesarean section, where maternal nausea and vomiting may limit the time spent in skin-to-skin contact (Nolan & Lawrence 2009).

The negative effects of separation appear to be long-lasting, with decreased maternal sensitivity, infant self-regulation, and dyadic mutuality and reciprocity observed 1 year after birth in infants who were separated from their mothers immediately after birth. Interestingly, rooming-in of infants did not compensate for a 2-hour separation immediately after birth (Bystrova et al. 2009).

Rooming-in

Rooming-in, that is keeping mother and baby together continuously during the day and night, has a number of benefits. For the mother it enables them to quickly learn their baby's needs and how best to care for and comfort their newborn, and makes breastfeeding easier. While babies are with their mothers they cry less, sooth more quickly, feed better, gain more weight per day and are less likely to develop jaundice. Research also suggests that rates of child abuse, neglect, and abandonment are lower for mothers who have frequent and extended contact with their newborns during the early postpartum period (Crenshaw 2007).

Studies have also shown that mothers who are with their babies for longer periods of time, including during the night, have higher scores on tests that measure the strength of a mother's attachment to her baby (Klaus et al. 1972; Norr et al. 1989; Prodromidis et al. 1995).

Breastfeeding

Separation can also negatively impact on breastfeeding. Babies who stayed in a nursery at the maternity ward and were taken to their mother's room for breastfeeding ingested less

milk than babies who were rooming-in and had access to breastfeeding on demand (Bystrova et al. 2007). An earlier study showed that separation of the baby from the mother in the first week after birth has a negative impact on breastfeeding duration, with 37% of separated mothers breastfeeding at 3 months compared with 72% of non-separated mothers (Elander & Lindberg 1984).

Definitional and measurement issues

Existing measures

Two existing measures used internationally include the WHO/UNICEF Baby-Friendly Hospital Initiative (BFHI) and the Canadian Maternity Experiences Survey (Public Health Agency of Canada 2009).

The WHO/UNICEF *Ten steps to successful breastfeeding* referred to earlier are the foundation of the BFHI and summarise the maternity practices necessary to support breastfeeding. One of the steps is relevant to Indicator 16: rooming-in to allow mothers and babies to remain together 24 hours a day. Suggestions for monitoring this recommendation include an infant feeding record, which records the baby's location ('rooming-in' is one of the options), and a questionnaire for mothers at discharge which asks where the baby was while the mother was in maternity services after giving birth ('my baby was with me both day and night' is one of the options) (WHO / UNICEF 2009).

The Canadian Maternity Experiences Survey included questions relevant to the Baby-Friendly Hospital Initiative. The survey asked mothers where their baby was during most of the first hour after birth (response options were 'in bed with you', 'in the same room as you, but not in your bed', and 'not in the same room as you') and how long their baby was in another room during the first 24 hours after birth (responses options of 'less than 1 hour', '1 hour to less than 6 hours', and '6 hours or more') (Public Health Agency of Canada 2009).

Defining 'additional care'

The ECG agreed that the purpose of Indicator 16 is to measure the separation of a healthy baby from the mother after birth, with the aim of minimising separation and enhancing mother–baby attachment, particularly in circumstances where additional care can be provided in the mother's room (for example, intravenous antibiotics or blood glucose monitoring).

A data item to capture whether a neonate is transferred to a special care nursery or neonatal intensive care unit (Neonate transfer to high care) is currently under development for inclusion in the Perinatal NMDS. This item is based on the Australian and New Zealand Neonatal Network definitions of high-level neonatal care units:

- A special care nursery (SCN) is a Level II nursery which generally cares for babies born at 32–36 weeks gestation weighing around 1,500 to 2,500 grams at birth. It includes care for babies who require intravenous therapy or antibiotics, and/or those who are convalescing after intensive care, and/or those who need their heart rate or breathing monitored, and/or those who need short-term oxygen therapy.
- A neonatal intensive care unit (NICU) is a Level III unit which cares for newborn infants who require more specialised care and treatment. It includes most babies born at less than 32 weeks gestation or less than 1,500 grams birthweight, and others who may require such interventions as intravenous feeding, and/or surgery, and/or

cardiorespiratory monitoring for management of apnoea or seizures, and/or require assisted ventilation, and/or supplemental oxygen over 40% or long-term oxygen.

The ECG recommended that 'additional care' be defined as care not requiring admission to an SCN (level II nursery) or NICU (level III nursery); however this may need further consideration in view of the definitions above, noting that the examples provided where additional care could be provided in the mother's room included intravenous antibiotics and blood glucose monitoring.

In addition, it may also be important to consider whether it will be difficult to detect improved outcomes for this indicator as babies admitted to an SCN or NICU attract funding for the hospital (as the days spent in SCN or NICU count as patient days) whereas babies treated on the wards do not attract funding for the hospital.

Related indicator

Overlap with Indicator 12, 'Babies born ≥37 completed weeks gestation admitted to a neonatal intensive care nursery / unit or special care nursery for reasons other than congenital anomaly', also needs to be considered in relation to the scope of this Indicator.

Consultation outcomes

The ECG concluded that:

- this is an important indicator to collect, and that the purpose is to measure the separation of a healthy baby from the mother after birth, with the aim of minimising separation and enhancing mother–baby attachment, particularly in circumstances where additional care can be provided in the mother's room (for example, intravenous antibiotics or blood glucose monitoring)
- 'additional care' be defined as care not requiring admission to a special care nursery (level II nursery) or a neonatal intensive care nursery/unit (level III nursery)
- 'after birth' be defined as within the first 24 hours
- this indicator be further developed with wider consultation to provide advice
- skin-to-skin contact is also important and should be developed as a separate indicator.

Following is a summary of the results of the wider consultation process.

Purpose

The majority of experts and stakeholders consulted (91%, 20 respondents) supported the proposed purpose of the indicator: 'To measure the separation of a healthy baby from the mother after birth, with the aim of minimising separation and enhancing mother–baby attachment'.

However, it was noted that reliable collection would be difficult.

Separation

Around three-quarters (76%, 16 respondents) agreed that a timeframe should be used for defining separation.

Of those who agreed, 38% (6 respondents) supported '1–3 hours' as an appropriate and feasible timeframe. One respondent added that this should be 1–3 hours over the entire 24-hour period, with the aim to keep each episode of separation at less than an hour. The remainder of respondents supported a '3–4 hour' timeframe (25%, 4 respondents), '6 hours or more' (25%, 4) or another timeframe (13%, 2).

Further consultation with state and territory NPDDC members was undertaken to seek additional input in relation to the parameters for the period of separation. Feedback indicated no definitive agreement for the period of separation, with most unsure as to whether the lower bound of the definition of separation should be 1 hour and the upper limit capped at 3 hours. In addition, most were unsure whether non-continuous periods of separation with the 24-hour period (or up to discharge) should be aggregated to determine whether separation had occurred. The following comments were provided:

- From birth, the first hour of life is the most crucial for newborns in terms of attachment, establishing breastfeeding and for outcomes from the labour process. Separation from the mother, for example, to be admitted to a special care nursery or neonatal intensive care for additional care is useful as a proxy indicator for the quality of intrapartal care. It would also include separation for women having caesarean births who should not be separated from their newborns immediately following the procedure in theatre, and in the recovery area prior to returning to the ward when it is safe for the mother and baby to do so. Too often, newborns are separated from their mothers in first hour following caesarean section due to staffing or unit processes, rather than quality of care.
- Any separation is undesirable, though sometimes necessary. Why not record any separation which could be operationalised as more than 5 minutes? Reporting anything longer than 5 minutes would simplify the need to aggregate non-continuous periods of separation. The burden (and consequent misreporting) will be substantial unless it is easy to identify and record.
- Propose that the period of separation be capped at 4 hours. Newborns are most commonly observed intensively for 4 hours following birth.
- It would be most efficient if separation was defined categorically, that is, 'yes/no'—in which case any separation of the minimum amount of time would be flagged as 'yes'.

After birth

A majority of respondents (62%, 13 respondents) reported that the period 'after birth' should be defined as the first 24 hours after birth. One-third of respondents (33%, 7) supported 'up to discharge', and only 1 respondent supported 'within the first hour'.

Respondents highlighted difficulties in collecting and comparing data with a time period of more than 24 hours, as significant differences in length of hospital stay could skew the results.

Additional care

A majority of respondents (82%, 18 respondents) agreed with the proposed definition of 'additional care' (see below). The proportions who somewhat agreed and did not agree were 9% each (2 in each group).

The proposed definition of 'additional care' is:

> Care not requiring admission to a special care nursery (level II nursery) or a neonatal intensive care nursery/unit (level III nursery) (based on the Australian and New Zealand Neonatal Network definitions below).
>
> Level II refers to a nursery that generally has babies born at 32–36 weeks gestation weighing around 1,500 to 2,500 grams at birth. It includes care for babies who require intravenous therapy or antibiotics, and/or those who are convalescing after intensive

care, and/or those who need their heart rate or breathing monitored, and/or those who need short-term oxygen therapy.

Level III or intensive care refers to the care of newborn infants who require more specialised care and treatment. It includes most babies born at less than 32 weeks gestation or less than 1,500 grams birthweight, and others who may require such interventions as intravenous feeding, and/or surgery, and/or cardiorespiratory monitoring for management of apnoea or seizures, and/or require assisted ventilation, and/or supplemental oxygen over 40% or long-term oxygen.

Scope

Table 2.16 outlines the types of additional care that were considered by respondents to not require admission to a special care or neonatal intensive care nursery for babies born at or after 37 completed weeks gestation.

Table 2.16: Suggested types of additional care not requiring admission to a special care or neonatal intensive care nursery for babies born at or after 37 completed weeks gestation

Type of additional care	No. of respondents
Phototherapy/jaundice	4
Intravenous antibiotics	4
Blood glucose measurement	3
Narcotic/drug withdrawal	2
Intrauterine growth restriction	1
Small for gestational age	1
Nasogastric intubation	1
Observation (not further defined)	1

Most respondents (87%, 20 respondents) agreed that this indicator (Indicator 16) should be restricted to babies born at or after 37 completed weeks gestation.

Detection of improved outcomes

More than half of respondents (13, or 57%) agreed that it would be difficult to detect improved outcomes for this Indicator, given that babies receiving medical care when admitted to an SCN or NICU attract funding for the hospital whereas those on the wards do not. A further 6 respondents (26%) 'somewhat agreed' with this statement and 4 respondents (17%) disagreed.

The ECG highlighted that this is the very reason this indicator should be captured, as babies should only be separated from their mothers for clinical indications, not financial reasons.

Collection

Regarding the best method of collecting data for this indicator, 7 respondents (39%) supported the NPDC, 7 respondents supported 'other' mechanisms, and 4 respondents (22%) supported an audit of labour ward records.

The following additional comments were provided:

- Where possible, all data required to support the reporting of this NCMI should be part of the NPDC. However, capturing this information would rely on staff recording in the

clinical record when a baby is separated from its mother and why, and midwives reviewing the record at the point of collating the data for the NPDC.

- Of those that supported 'other', the mechanisms suggested were: patient experience survey, collection on local/onsite clinical databases, Australian and New Zealand Neonatal Network collection, and a pilot study to inform the best method.
- Overall, there were difficulties in collecting this information.

Further consultation with state and territory NPDDC members was undertaken to seek additional input in relation to current data collection practices and the best method of collection. Feedback indicated that currently 1 jurisdiction collects data on newborns requiring additional care during admission for birth episode (excluding babies of less than 37 completed weeks gestation, non-cephalic presentation, multiple births and those with birth defects), via the diagnosis related groups in their admitted episodes dataset.

NPDDC members considered that a survey conducted on an ad hoc basis would be the best method to collect these data, noting that:

- New data items in the NPDC would be required to support this Indicator.
- A manual collection via audit of labour ward records may not be appropriate, as it places a data collection burden on health service staff.
- A baseline survey could be carried out and repeated one year later to examine progress. However, obtaining satisfactory levels of participation would be challenging and require active co-ordination. But equally, if midwives are overburdened with data collection, they may 'guess' the reason that a baby was admitted to an SCN or NICU if collected as part of the routine perinatal data collection.
- Much depends how much information is to be collected. 'Yes/no' responses are collected well in the perinatal data collection, but if multiple questions need to be answered, then an audit or survey would be better.
- All options for collection of these data should be assessed and the most appropriate method selected. Collection of these data nationally should not occur via the Perinatal NMDS. Every proposal to add to or modify items in the Perinatal NMDS places a significant burden on state and territory departments, software vendors and health services. In this case, a good survey design will yield the same information, or better.

NPDDC members also raised the following significant issues in implementing collection of these data in jurisdictions:

- Funding would be required to enable co-ordination and resourcing of hospitals to undertake collection, or to have the collection undertaken by independent researchers.
- If more than a 'yes/no' categorical question is required in the perinatal data collection, collection would be difficult.
- Sufficient business justification would need to be made—the proposed benefit should be equal to or greater than data collection and implementation burden. There are significant costs for health services to implement a new data item into their clinical and administrative systems and regulatory reporting processes.
- Difficult item to capture, particularly if the mother and baby have several episodes of separation.
- It would be unacceptably burdensome for midwives to scour the baby's record at the time of discharge to add up all periods of separation to see if they summed to more than

60 minutes, but less than 180 minutes. A 5 minute cut-off would be easier because identifying a single instance would not require further investigation.

- There may not be adequate record keeping in the mother's or baby's patient notes to allow determination of the amount of separation.

Recommendations for next steps

- While Indicator 16 is considered to be important by some to bring about changes in practice, others are not convinced about its feasibility. Many definitional and collection issues could not be resolved conclusively, either by reference to the evidence base or through the stakeholder consultation process. These issues include the parameters for defining the period of separation, the quality and availability of information, the response burden, and resource implications associated with the collection of information for this indicator.
- It is recommended that further development of this indicator not be progressed.

2.2.3 Proposed new indicator: Skin-to-skin contact between mother and baby after birth

During the discussion of Indicator 16 'Separation of baby from the mother after birth for additional care', ECG members suggested that skin-to-skin contact was also important and that it be developed as a separate indicator.

This proposed new indicator has been considered by ECG members, and by key experts and stakeholders engaged via a consultation process. The main issues considered were:

- level of support for the development of the indicator
- purpose
- rationale and evidence to support the indicator
- definitional and measurement issues, including how to define after birth.

Details of these issues are outlined below.

Level of support

The ECG concluded that:

- development of the indicator is important, for the reasons given below (see 'Purpose of the indicator' and 'Evidence and rationale for the indicator' sections below)
- it was feasible to collect information on whether skin-to-skin contact occurred within 60 minutes of birth.

Key experts and stakeholders also supported the development of the indicator (see 'Consultation outcomes' section for details).

Purpose of the indicator

Placing the baby in skin-to-skin contact with the mother immediately after birth promotes mother–baby attachment and breastfeeding. This indicator is used to benchmark practice.

Evidence and rationale for the indicator

Skin-to-skin contact between mother and baby immediately after birth can help to regulate infant temperature and increases the natural progression to breastfeeding. A recent Cochrane

review showed that skin-to-skin contact between the mother and baby immediately after birth increased the likelihood of the mother's breastfeeding in the first 1 to 4 months and increased the duration of breastfeeding (Moore et al. 2012). In a recent survey of infant feeding in Australia, 98% of children who were placed in skin-to-skin contact with their mothers around the time of birth had 'any breastfeeding' compared with 89% of children not placed in skin-to-skin contact (AIHW 2011).

Research suggests that women who hold their babies skin-to-skin following birth are more confident and able to recognise their baby's needs sooner than mothers who are separated from their babies (Widstrom et al. 1990).

Skin-to-skin contact has other benefits for the baby, such as improved breathing, lower levels of stress hormones, higher and more stable blood sugar levels, less crying, protection from harmful germs and therefore sickness due to exposure to normal bacteria on the mother's skin (Crenshaw 2007), increased quiet sleep duration and decreased autonomic activity compared with sleeping in a bassinette next to the mother's bed (Morgan et al. 2011). The benefits are also greater if the contact continues beyond the first hour, that is, longer and more frequent skin-to-skin contact (Crenshaw 2007).

A study of the influence of birth routine on mother–infant interactions showed that mothers who experienced skin-to-skin contact after birth followed by rooming-in were less rough with their babies during a breastfeeding session on day 4 than mothers who were separated from their babies for 2 hours following birth and then experienced rooming-in (Dumas et al. 2013). The study concluded that immediate and uninterrupted skin-to-skin contact at birth, followed by rooming-in during postpartum be encouraged, as recommended in the World Health Organization/UNICEF *Ten steps for successful breastfeeding.*

Definitional and measurement issues

Existing measures

Searches using the National Quality Measures Clearinghouse, Medline and Google found indicators measuring skin-to-skin contact after birth such as the Optimality Index US, which defines skin-to-skin contact as:

> Placement of the unwrapped newborn infant in direct contact with maternal skin as immediately as possible or appropriate following birth; both infant and mother are then covered with a thermal conservation cover/blanket (Murphy & Fullerton 2012).

The *Ten steps to successful breastfeeding* are the foundation of the WHO/UNICEF Baby-Friendly Hospital Initiative (BFHI) and summarise the maternity practices necessary to support breastfeeding. The step that is relevant to this indicator is 'promotion of skin-to-skin contact between mother and baby immediately after birth for at least one hour'. Suggestions for monitoring this recommendation include: an infant feeding record, which records whether mother and baby experienced skin-to-skin contact from within 5 minutes of birth for at least an hour (unless delay in contact is justified); and a questionnaire for mothers at discharge which asks how soon after birth the mother held her baby, the reason if there was a delay of more than 5 minutes, whether there was skin-to-skin contact, and how long she held her baby the first time (WHO/UNICEF 2009).

What mothers say: the Canadian maternity experiences survey (Public Health Agency of Canada 2009) includes questions relevant to the Baby-Friendly Hospital Initiative. The survey asks mothers how soon after birth they first held their baby, the reason for any delay in first

holding their baby, whether the contact was skin-to-skin, and where their baby was during the first hour after birth.

Maternity – towards normal birth in NSW (NSW Health 2010) requires all maternity services to undertake an annual audit of skin-to-skin contact within 1 hour of birth, with a target of 90% by 2015.

Clinical guidelines and recommendations

A number of local and international guidelines recommend skin-to-skin contact immediately after birth. The Royal Australian and New Zealand College of Obstetricians and Gynaecologists recommends that 'maternity services should adhere to the principles and work toward the recommendations of UNICEF/WHO Baby-Friendly status' and that 'skin-to-skin (contact) should last until after the first breastfeed or until the mother chooses to end it' (RANZCOG 2011). Similarly, the UK National Institute for Health and Clinical Excellence recommends that 'women should be encouraged to have skin-to-skin contact with their babies as soon as possible after the birth' and that 'separation of a woman and her baby within the first hour of the birth for routine postnatal procedures, for example weighing, measuring and bathing, should be avoided unless these measurements are requested by the woman, or are necessary for the immediate care of the baby' (NICE 2006).

Australian state guidelines (Queensland, South Australia and Western Australia) recommend that babies be placed in skin-to-skin contact immediately after birth and that the contact should continue for a minimum of 1 hour (Queensland Maternity and Neonatal Clinical Guidelines Program 2012; South Australian Perinatal Practice Guidelines Workgroup 2012; Department of Health, Western Australia 2009). Individual hospital guidelines make similar recommendations (Royal Women's Hospital 2013b; KEMH 2012).

Consultation outcomes

The majority of respondents in the wider consultation process:

- supported the development of a new indicator to measure skin-to-skin contact between mother and baby after birth (78%, 18 respondents), noting that there is good evidence for its benefit, that data is relatively easy to collect, and that it is already collected for BFHI. However, 1 respondent was not sure of its value as a clinical indicator.
- supported the proposed purpose of the indicator (91%, 20 respondents): 'Placing the baby in skin-to-skin contact with the mother immediately after birth promotes mother–baby attachment and breastfeeding. This indicator is used to benchmark practice.'
- agreed that the timeframe for skin-to-skin contact should be within 60 minutes of birth (95%, 21 respondents); however, 1 respondent noted that it would be also important to determine how much time spent in skin-to-skin contact would qualify as a 'yes'? That is, what is the minimum portion of the first 60 minutes that would qualify as a 'yes'?
- agreed that data for this indicator would be best collected from the midwife completing the labour ward summary (95%, 19 respondents).

Following consultation with the MSIJC, it was recommended that the WHO/UNICEF BFHI definition for skin-to-skin contact between mothers and babies be used.

A draft technical specification incorporating the results from the consultation is provided in Appendix C.

Further consultation with state and territory NPDDC members was undertaken to seek additional input on current data collection practices and the best method for collection. New

South Wales currently collects data for this indicator at the baby level, capturing skin-to-skin contact within 1 hour of birth in their ObstetriX system—but are yet to report on this data. The data item requires recording of any skin-to-skin contact in the first hour of life and does not specify continuous contact, or any relationship to feeding. Responses for the data item are yes/no/not applicable. In addition, individual hospitals involved with BFHI may require documentation that skin-to-skin contact occurred within the first 15 minutes, and this indicator could be incorporated into this accreditation process.

There was no consensus on the best method for collecting the information or the frequency of collection. Some considered an audit of labour wards records to be the best method, while others felt a survey was most appropriate. Likewise, some considered that data should be collected annually, while others thought that it should be on an ad hoc basis.

NPDDC members also raised some concerns in relation to this indicator, as follows:

- It is not worthwhile to include this in a routine data collection at a national level.
- New data items in the NPDC would be required.
- For those hospitals involved with BFHI, this would be the most appropriate source of data—but not all hospitals are BFHI, so they may not be documenting this information.
- All options for the collection of this data should be assessed and the most appropriate selected. Collection of this data nationally should not be via the Perinatal NMDS. Every proposal to add or modify items in the Perinatal NMDS places a significant additional burden on state and territory departments, software vendors and health services. A good survey design will yield the same information, or better.
- Sufficient business justification would be needed, that is, proposed benefit should be equal to or greater than the data collection and implementation burden. There are significant costs for health services in incorporating a new data item into their clinical and administrative systems and regulatory reporting processes.

Recommendations for next steps

- While this indicator is considered to be important by some to bring about change in practice, as well as to measure compliance with existing practice, others are not convinced about its usefulness as a clinical indicator. One jurisdiction currently collects data on skin-to-skin contact. While definitional issues have been largely resolved, there appear to be remaining issues associated with the best method for collecting the data, response burden and resource implications.
- It is recommended that further development of this indicator should be pursued using the WHO/UNICEF Baby-Friendly Hospital Initiative (BFHI) definition for skin-to-skin contact between mothers and babies.

2.2.4 Indicator 17: One-to-one care in labour

ECG members have considered this indicator, as well as key experts and stakeholders engaged via a consultation process. The main issues were:

- purpose, including what is the most appropriate focus for the indicator
- rationale and evidence to support the indicator
- definitional and measurement issues, including how to define one-to-one care.

Purpose of the indicator

The purpose of this indicator is to measure one-to-one midwifery care in labour, with the aim of optimising normal birth and minimising unnecessary interventions.

Evidence and rationale for the indicator

A recent Cochrane review by Hodnett and others (2012) of continuous support for women during childbirth found that women with continuous, one-to-one support were more likely to experience a spontaneous vaginal birth and a shorter labour, less likely to use analgesia in labour, and less likely to have a baby with a low Apgar score at 5 minutes. The person providing the support was either trained (such as a midwife or doula) or untrained (such as a family member, spouse or friend) in providing labour support. This review concluded that continuous, one-to-one support in labour should be offered to all women. However, it should be noted that the effectiveness of the support provided by hospital staff members appeared to be less than that provided by caregivers not employed by an institution. Reasons proposed for this included divided loyalties, additional duties besides labour support, and the constraints of institutional policies and routine practices (Hodnett et al. 2012).

Evidence from another Cochrane review by Hatem and others (2008) showed increased rates of spontaneous birth and reduced intervention during labour with midwifery-led models of care, where the midwife is the lead provider of care during pregnancy, delivery and in the postnatal period. Women who received midwife-led models of care were more likely to have a spontaneous vaginal delivery, have a known midwife attend the birth and initiate breastfeeding, and were less likely to have an episiotomy, instrumental delivery or regional analgesia (Hatem et al. 2008). It should be noted that this study included all types of midwifery-led care, which included team midwifery as well as caseload models. Midwifery-led models of care encompass more than just one-to-one care in labour. Also, women in other models of care, such as private obstetrics with public hospital maternity care, can still get one-to-one care in labour by a midwife if the public hospital maternity unit is staffed accordingly.

A recent study in Australia found that women receiving caseload midwifery care, where women are more likely to have one-to-one care, were more likely to have a spontaneous vaginal birth, and less likely to have a caesarean delivery, epidural analgesia, an episiotomy or to have their baby admitted to a special care nursery or neonatal intensive care unit. Women assigned to caseload midwifery care received antenatal, intrapartum and postpartum care from a primary midwife with some care by 'back-up' midwives (McLachlan et al. 2012).

In Australia, Queensland is the only jurisdiction to recommend one-to-one care by a registered midwife for all women in established labour (Queensland Health 2012). New South Wales requires one-to-one midwifery care for all women experiencing their first labour, undergoing induction of labour using oxytocics, and undertaking a vaginal birth after caesarean section, vaginal breech, or vaginal twin birth. This is a key measure for improvement in New South Wales, and will be reported on from 2011 (NSW Health 2010).

When the Healthcare Commission in the UK carried out a survey in 2007, they found that 26% of women 'were left alone during labour at a time when it worried them to be alone' (Healthcare Commission 2007). In the UK, a number of government policies for maternity services contain a commitment to continuity of midwifery care, which incorporates providing individual support to women throughout their labour and birth. For example, the Keeping Childbirth Natural and Dynamic program in Scotland supports one-to-one care

during the first and second stages of labour; and the National Service Framework for Children, Young People and Maternity Services in Wales sets a standard for women to receive one-to-one care (one woman receiving the dedicated time of a midwife) once labour is established.

A review of evidence on continuity of carer and which aspect of continuity matters most to women was carried out by Green and others (2000). These authors found no evidence to support the notion that women cared for in labour by a midwife whom they had already met were more satisfied than those who had not previously met their midwife. The authors concluded that women wanted consistent care from a caregiver whom they trust, but not continuity of a carer for its own sake.

Sosa et al. (2011), systematically examined the research literature to answer the 'who, what, when, where, and how' for providing one-to-one support in labour, as well as reviewing the meaning of the concept and definitions of one-to-one care. They found that the term 'one-to-one support in labour' is used in a range of research reports and policy documents without a clear consensus on its definition. These authors found that despite strong evidence for the benefits of one-to-one support in labour, the utility of the evidence base is limited by failure to specify what is meant by one-to-one support, leading to a lack of comparability among the various studies.

Relationship to models of care

An important consideration for this indicator is how it relates to models of care. *Models of care* was proposed for inclusion as an NCMI by the MSIJC Expert Working Group (Indicator 20), and is a component of the National Maternity Data Development Project (NMDDP).

As part of the NMDDP, the AIHW National Perinatal Epidemiology and Statistics Unit developed the Maternity Care Classification System (MaCCS) to enable the identification and description of current and future models of care in Australia. The MaCCS describes models of care, not the experiences of individual women. As such, it is possible that some women may not receive the level or type of care set out by their chosen model of care due to changes in individual circumstances requiring different care plans.

Including 'one-to-one care in labour' within the MaCCS data items was considered as part of the MaCCS project, but the project team concluded that there was too much variability between the intention of a model and the actual care received by individuals. It is possible for women to receive one-on-one care when it is not specified in their model of care, and vice versa.

Definitional and measurement issues

Existing measures

The UK report *Safer childbirth: minimum standards for the organisation and delivery of care in labour* (RCA, RCM, RCOG & RCPCH 2007) recommends that every woman in established labour receives one-to-one care from a midwife—however, no direct measures of this are detailed in the report. The report suggests that the appropriate staffing level of midwives to women in labour is between 1.0 and 1.4 full-time equivalent midwives, depending on case mix. The NHS program for increasing normal birth (reducing the caesarean section rate) has an indicator for one-to-one care in labour for all women during their first pregnancy. The Maternity Dashboard, a clinical performance and governance scorecard, developed to allow monitoring 'on the ground' on a monthly basis, records the overall ratio of midwives to

births, and suggests a level of 1.3 full-time equivalents, but does not directly measure one-to-one care in labour (RCOG 2008).

In Australia, NSW Health uses its Birthrate Plus tool to determine midwifery staffing levels for women to receive one-to-one care in labour. London's Maternity Services Commissioning Improvement Project (no date) suggests some methods for auditing one-to-one midwifery care in established labour, such as an audit sheet completed by the labour ward coordinator and qualitative surveys of staff and women.

Consultation outcomes

ECG conclusions that were included in the wider consultation were:

- the focus of this indicator was having a midwife, rather than a nurse, present for the duration of labour (i.e. continuous care during labour) and that a woman in labour is not left alone
- continuity of carer was not considered to be as important, and it was noted that this is very difficult to collect
- the purpose be defined as a measure of one-to-one care in labour with the aim of optimising normal birth (that is, physiological birth) and decreasing unnecessary interventions
- 'one-to-one care' be defined as 'A woman in established labour receives care from an assigned midwife for the whole of that labour, or the midwife's whole shift, whichever is the shorter. This midwife will be available to care for the woman 100% of the time. At the end of the shift, if necessary, care will be handed over to another assigned midwife, who will continue the one-to-one care of that woman.'(based on the definition used in London's Maternity Services Commissioning Improvement Project, no date)
- all women in labour be included, but that it could be restricted to primiparas
- this indicator be further developed with wider consultation to provide advice.

The majority of respondents in the wider consultation process agreed that the focus of this indicator is about continuous care during labour, that is, having a midwife, rather than a nurse, present for the duration of labour and that a woman in labour is not left alone (95%, 21 respondents).

Just over half of respondents (52%, 12) agreed, and almost one-third somewhat agreed (30%, 7) that continuity of carer is not as important as continuity of care. In their comments, respondents acknowledged the difficulty of collecting information on continuity of carer, as well as the practical issues involved in providing continuous care from the same midwife for the duration of labour. They noted that while continuity of carer is ideal and desired by women, continuity of care is most important and consistent care can be provided by multiple caregivers.

Most respondents supported (77%, 17) or somewhat supported (14%, 3) this proposed purpose of the indicator: 'To measure one-to-one midwifery care in labour, with the aim of optimising normal birth (that is, physiological birth) and minimising unnecessary interventions'.

Nearly two-thirds of respondents (64%, 14) preferred the definition of one-to-one care based on London's Maternity Services Commissioning Improvement Project guidance notes (no date):

A woman in established labour receives care from an assigned midwife for the whole of that labour, or the midwife's whole shift, whichever is the shorter. This midwife will be available to care for the woman 100% of the time. At the end of the shift, if necessary, care will be handed over to another assigned midwife, who will continue the one-to-one care of that woman.

Most respondents thought that the indicator should not be restricted to low risk women (87%, 20), noting that all women in established labour would benefit from receiving one-to-one midwifery care.

In terms of data collection, the majority of respondents agreed that the best mechanism was from the midwife completing the labour ward summary (95%, 20).

Further consultation with state and territory NPDDC members was undertaken to seek additional input in relation to current data collection practices and the best method of collection. New South Wales is currently developing an item to capture data to report against Step 9 of *Maternity – towards normal birth in NSW,* which recommends one-to-one care for women experiencing their first labour, or undertaking vaginal birth after caesarean, vaginal breech or vaginal twin birth (NSW Health 2010). The item will either include these categories only, or be filtered for reporting purposes from all births, and be captured in their ObstetriX system.

There was no consensus on the best method for collecting the information or the frequency of collection. Some NPDDC members thought a survey to be the best method, while others felt the NPDC was most appropriate. Likewise some felt that data should be collected on an ad hoc basis, while others said that it was too hard to collect.

Other concerns raised in relation to this indicator by NPDDC members were:

- It is difficult to collect genuine data for this indicator, and it is not clear how the data would be validated.
- Not sure this data should be collected, as there are other better indicators measuring quality of care in the existing set of national maternity indicators.
- Not convinced a hospital survey would provide more than aspirational responses here. Perhaps a survey of women would be most appropriate. Auditing labour ward records would not capture times when the midwife was absent from the room.
- Collection of this data would place undue strain on already overworked labour wards and midwives.
- All options for the collection of this data should be assessed and the most appropriate selected. Collection of this data nationally should not be via the Perinatal NMDS. Each proposal to add or modify items in the Perinatal NMDS places a significant additional burden on state and territory departments, software vendors and health services. A good survey design will yield the same information, or better.

Recommendations for next steps

- Although one-to-one care in labour is an important goal for maternity care, there is widespread acknowledgement of the difficulty in collecting information to report against this indicator. While definitional issues have been largely resolved, there appear to be remaining issues associated with the best method for collecting the data, response burden and resource implications.
- It is recommended that further development of this indicator not be progressed.

3 Summary of next steps

Recommendations for next steps for each of the indicators are summarised in Table 3.1. Broadly, we recommend that:

- Indicators 13, 15 and 18 are added to the set of NCMIs for reporting, accompanied by clinical commentary.
- Because Indicator 14 aligns with the data items on postpartum haemorrhage added to the 2014–15 Perinatal DSS, Indicator 14 should be added to the set of NCMIs for reporting, accompanied by clinical commentary.
- Data items for reporting against Indicator 12 and the new proposed indicator 'Skin-to-skin contact between mother and baby after birth' be developed further so that both Indicators can be included in the NCMIs.
- Indicators 11, 16 and 17 not be pursued further at this time.

Table 3.1: Summary of recommendations for Indicators

Indicator		Recommendation
11	High risk women undergoing caesarean section who receive appropriate pharmacological thromboprophylaxis	Further development of this indicator should not be progressed.
12	Babies born ≥37 completed weeks gestation admitted to a neonatal intensive care nursery or special care nursery for reasons other than congenital anomaly	Consideration is given to the development of a *Reason for admission to SCN / NICU* data item, which would include congenital anomaly as a data value, in consultation with the NPDDC, for inclusion in the Perinatal NMDS. Alternatively, a flag to indicate that an admission to the SCN/NICU was for a reason other than a congenital anomaly could be considered for inclusion in the Perinatal NMDS. Cross-checks continue to be performed between NHMD and NPDC data to check the consistency between the two collections.
13	Third and fourth degree tears for (a) all first births and (b) all births	This indicator be added to the set of NCMIs for reporting and be accompanied by clinical commentary.
14	Blood loss of (i) ≥1,000 mL and <1,500 mL and (ii) ≥1,500 mL during first 24 hours after the birth of the baby (that is, major primary PPH) for (a) vaginal births and (b) caesarean sections	The NPDC still remains the best option for reporting against this indicator, particularly as the NPDC has the capacity to identify the severity of PPH, and this information can be used in conjunction with other information, such as duration of pregnancy, that are not available from the NHMD. Data items have been standardised and included in the Perinatal DSS to support the national collection and reporting of primary PPH as part of the NMDDP. Indicator 14 has been amended to align with these data items (lower limit of blood loss included is now greater than or equal to 1,000 mL). Work to include the NMDDP data items in the NMDS is continuing. This indicator be added to the set of NCMIs for reporting and be accompanied by clinical commentary.
15	Women having their second birth vaginally whose first birth was by caesarean section	This indicator be added to the set of NCMIs for reporting and be accompanied by clinical commentary. When reporting against this indicator it will be important to be clear about the purpose and for the analysis to be presented together with caesarean section and morbidity rates.

(continued)

Table 3.1 (continued): Summary of recommendations for indicators

	Indicator	Recommendation
16	Separation of baby from the mother after birth for additional care	Further development of this indicator should not be progressed.
17	One-to-one care in labour	Further development of this indicator should not be progressed.
18	Caesarean sections <39 weeks (273 days)	This indicator be added to the set of NCMIs for reporting and be accompanied by clinical commentary. The indicator should only refer to 'no labour'. Use the Indications for caesarean section item developed as part of the NMDDP, and use the following codes as justification for pre-term caesarean section and no labour: 01 Fetal compromise 07 Placenta praevia 08 Placental abruption 09 Vasa praevia 10 Antepartum/intrapartum haemorrhage 19 Other obstetric, medical, surgical, psychological indications. Certain maternal morbidities, such as hypertension and diabetes, do not need to be captured in the Indications for caesarean section data item on the basis that they are underlying conditions and not the reason for the actual caesarean section procedure.
	Skin-to-skin contact between mother and baby after birth	Further development of this indicator should be progressed.

Appendix A: List of stakeholders consulted

The consultation process included experts and stakeholders from the following areas:

- National Core Maternity Indicators Expert Commentary Group
- Maternity Services Inter-Jurisdictional Committee Expert Working Group
- National Maternity Data Development Project Advisory Group
- National Maternity Data Development Project Clinical Data Reference Group
- National Health Information Standards and Statistics Committee
- Women's Healthcare Australasia.

People consulted included:

Name	Affiliation
Mr John Agland	Manager, Performance Reporting Health System Information and Performance Reporting, NSW Health
Ms Terri Barrett	Midwifery Director, Statewide Obstetric Support Unit, King Edward Memorial Hospital, Western Australia
Mr Paul Basso	Director, Health Intelligence, Department of Health, South Australia
Professor Leonie Callaway	Queensland Maternal and Perinatal Quality Council; Head, University of Queensland Royal Brisbane Clinical School
Ms Helen Cook	Australian College of Midwives
Ms Suzanne Cornes	Executive Director, Health Statistics Centre, Queensland Health; Chair, National Perinatal Data Development Committee
Dr Mary-Ann Davey	Faculty of Health Sciences, School of Nursing and Midwifery, Mother and Child Health Research Centre, LaTrobe University, Victoria
Professor Jodie Dodd	Chair, Maternal and Neonatal Clinical Network, South Australia
Ms Louise Edmonds	Senior Manager, Information Management Section, ACT Health
Professor David Ellwood	Professor, Obstetrics and Gynaecology, Griffith University; Director of Maternal-Fetal Medicine, Gold Coast Health District, Queensland
Associate Professor Vicki Flenady	Director, Centre for Translating Research into Practice, Mater Medical Research Institute, Queensland
Mr Mark Gill	Assistant Director, Health Information, Metropolitan Health and Aged Care Services, Department of Health, Victoria
Professor Caroline Homer	Faculty of Nursing, Midwifery and Health, University of Technology Sydney, New South Wales
Dr Janet Hornbuckle	Consultant in Maternal Fetal Medicine, King Edward Memorial Hospital; Honorary Senior Lecturer in Obstetrics and Gynaecology, University of Western Australia
Professor Michael Humphrey	Clinical Adviser, Office of Rural and Remote Health; Senior Medical Coordinator, Obstetrics Retrieval Services Queensland; Chair, Queensland Maternal and Perinatal Quality Council
Mr Mark Johnson	Acting Manager, Information Standards and Monitoring, Tasmania Department of Health and Human Services
Associate Professor Rebecca Kimble	Chair, Statewide Maternity and Neonatal Clinical Network, Queensland
Ms Ann Kinnear	Executive Officer, Australian College of Midwives

(continued)

Name	Affiliation
Dr Michael Nicholl	Senior Clinical Advisor, Obstetrics, Ministry of Health, New South Wales
Professor Jeremy Oats	Chair, Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity; Medical Co-Director, Northern Territory Integrated Maternity Service; Professorial Fellow, Department of Obstetrics and Gynaecology, University of Melbourne
Professor Michael Permezel	President, Royal Australian and New Zealand College of Obstetrics and Gynaecology
Mr Tim Reid	Director, Information Management and Reporting Directorate, Health Information Networks, Department of Health, Western Australia
Associate Professor Christine Roberts	Clinical and Population Perinatal Health Research, The Kolling Institute, University of Sydney, New South Wales
Emeritus Professor Jeffrey Robinson	Emeritus Professor of Obstetrics and Gynaecology, University of Adelaide, South Australia
Dr Wendy Scheil	Head, Pregnancy Outcome Statistics Unit, Epidemiology Branch, SA Health
Ms Veronica Snook	Director, System Performance, Strategy and Reform, Department of Health, Northern Territory
Ms Diana Stubbs	Liaison Midwife, Department of Health, Victoria
Dr Barbara Vernon	Chief Executive Officer, Women's Healthcare Australasia
Ms Desley Williams	Coordinator, Darwin Midwifery Group Practice, Northern Territory

Appendix B: Summary of results of consultation

The survey was distributed to 30 contacts based on membership of the MSIJC Expert Working Group, NMDDP AG and CDRG, plus additional experts and stakeholders previously involved in NMDDP consultation.

There were 23 respondents to the survey, held between 28 June 2013 and 23 July 2013.

Feedback was sought on aspects of Indicators 11, 16, 17, 18 and the proposed new NCMI 'Skin-to-skin contact between mother and baby after birth'. This Appendix summarises the survey responses and comments received in relation to each Indicator.

NCMI 11: High risk women undergoing caesarean section who receive appropriate pharmacological thromboprophylaxis

Background

As outlined in the scoping document, a number of issues were identified when this indicator was discussed by the Expert Commentary Group (ECG). There is limited evidence available from randomised controlled trials on which to base recommendations for use of pharmacological thromboprophylaxis after caesarean section, and practitioners rely on consensus-based clinical practice guidelines, which, broadly, recommend the use of pharmacological thromboprophylaxis after caesarean section in women with additional risk factors for venous thromboembolism (VTE). However, there is a lack of consensus on what defines high-risk women and it may not be feasible to reach consensus on this aspect. In addition, considerable variation in practice for pharmacological thromboprophylaxis after caesarean section exists. The ECG suggested that the rate for this indicator may be 50–60%, and that it may not vary significantly over time. The Australian Council on Healthcare Standards (ACHS) collects data on this indicator. However, the ECG raised concerns about the value of collecting these data for the NCMIs, and recommended that further development of Indicator 11 not be progressed.

Results

The majority of respondents (83%, 19 respondents) agreed with the ECG recommendation that further development of this indicator not be progressed.

Four respondents (17%) did not agree that indicator development should not progress, and went on to respond to subsequent open-ended questions around definitional and measurement issues.

Rationale for the ACHS indicator

The Australian Council on Healthcare Standards (ACHS) includes the following rationale for this indicator, proposed for possible adaptation and use for the NCMI:

> Thromboembolism is a major cause of maternal morbidity. Pregnancy is a risk factor for venous thromboembolism and the risk is higher if birth is by caesarean section, especially emergency caesarean section. A fall in deaths from venous thromboembolism after caesarean section was observed in the UK after introduction of the RCOG guidelines for thromboprophylaxis in 1995.

> These guidelines are consensus guidelines as there is a paucity of adequately conducted trials on which to base recommendations.
>
> The rate for this indicator will not be 100% as there will be some women where the clinician does not deem it appropriate (ACHS 2013a).

Three respondents provided comments on the rationale: 1 respondent agreed with the ACHS rationale (R1), while another thought that the rationale was dependent on the definition of high risk (R23):

R1: 'There is broad consensus that thromboprophylaxis should be administered following caesarean section for at risk women. I concur with the ACHS rationale.'

R23: 'I think the rationale for using this indicator depends very much on how high risk is defined.'

The final comment was more general in nature, but appeared to be supportive of the rationale:

R17: '…It is unlikely that high level evidence will ever be available from large prospective randomised clinical trials on thromboprophylaxis. Therefore, expert opinion may have to prevail for some time to come. It will be difficult to obtain national agreement on a useful indicator; however, I still maintain that this work needs to be done. If national agreement cannot be reached, then state collection of trial indicators should be encouraged.'

Expected variation in the indicator over time

Two responses were received. R23 made the point that the expected variation in the indicator over time '…depends on how tight the [high-risk] definition is. If the high risk group is relatively small then less variation would be expected'.

R1 provided the comment: 'Would expect that the "compliance" rate will increase following the publication of the Maternity Indicator from current 73% to mid-90s%'. However, the rate for the indicator will depend on the definition used, and this may or may not be the same as the ACHS indicator, so 73% will not necessarily be a suitable baseline.

Definition of high-risk women

Three responses were received relating to how high-risk women should be defined. One respondent commented that South Australia commenced work on this and that the lists were remarkably similar (R17). Further work may be able to build on this.

The remaining two responses were conflicting. One respondent proposed a broad definition based on one or more risk factors from the RCOG Clinical Practice Guidelines (R1), while the other proposed a narrow definition to capture only those at very high risk of VTE (that is, previous deep vein thrombosis (DVT) or pulmonary embolism (PE), high body mass index (BMI) (>40), thrombophilia), with the comment that:

> Defining high risk as anyone with BMI>30 or age over 35 will inevitably lead to considerable variation as there is no consensus on the appropriate use of thromboprophylaxis and therefore it will not be useful as an indicator. (R23)

Accounting for variation in current practice for pharmacological thromboprophylaxis

Respondents proposed several reasons for the variation in current pharmacological thromboprophylaxis practice:

- Lack of awareness among clinicians of current recommendations (R1)

- Perceived contra-indications to administration of anticoagulant therapy (R1)
- Inadequate recording and reporting (R1)
- Lack of high-level evidence (R17)
- Lack of clear national position/guidelines (R17, R23)
- Lack of consensus of who is high-risk (R23).

Core elements relating to use of thromboprophylaxis

Respondents were asked about the core elements relating to use of pharmacological thromboprophylaxis to prevent venous thromboembolism in pregnancy that need to be included. Two respondents provided elements that were broadly consistent:

- Risk factors (yes/no) (R1)/list of recommended risk factors (R17)
- Administration of an anticoagulant (R1)/recommended treatment (dose, duration) (R17).

The third respondent provided a more general comment, that the indicator '…should be restricted to those in whom the evidence for their use is relatively strong'. (R23).

Establishing a target rate

Respondents were asked to comment on how a target rate for this indicator could be determined, given that it would be less than 100%, as clinicians will consider pharmacological thromboprophylaxis inappropriate for some women.

Two responses were received, which both appear to suggest that the target rate for the indicator would be high. Respondent 1 proposed the 90th centile, while Respondent 23 commented that 'If a high-risk group is tightly defined then it will be a more meaningful indicator', implying that the target rate would be high if this was done.

NCMI 16: Separation of baby from the mother after birth for additional care

Background

ECG members discussed several issues and made several recommendations for defining this indicator, including its purpose. The ECG recommended that the term 'after birth' be defined as within the first 24 hours, and that 'additional care' be defined as not requiring admission to either a level II or level III nursery.

Results

Purpose of indicator

A large majority of respondents (91%, 20 respondents) supported the proposed purpose of the indicator, 'To measure the separation of a healthy baby from the mother after birth, with the aim of minimising separation and enhancing mother–baby attachment'.

Additional comments on the purpose of this indicator were provided by 6 respondents. There was support for collecting this information; however, 2 respondents noted that reliable collection would be difficult and 3 respondents referred to definitional issues around 'separation', 'healthy baby' and 'additional care' (some of these comments are presented below under 'Definitions').

One respondent did not support this indicator (Indicator 16):

> I don't believe that healthy babies are separated from mothers. Failure to identify a valid reason is a defect of the data collection not of clinical management. I would drop this altogether. (R22)

Definitions

Respondents were asked specific questions regarding the definitions of, 'separation', 'after birth' and 'additional care'.

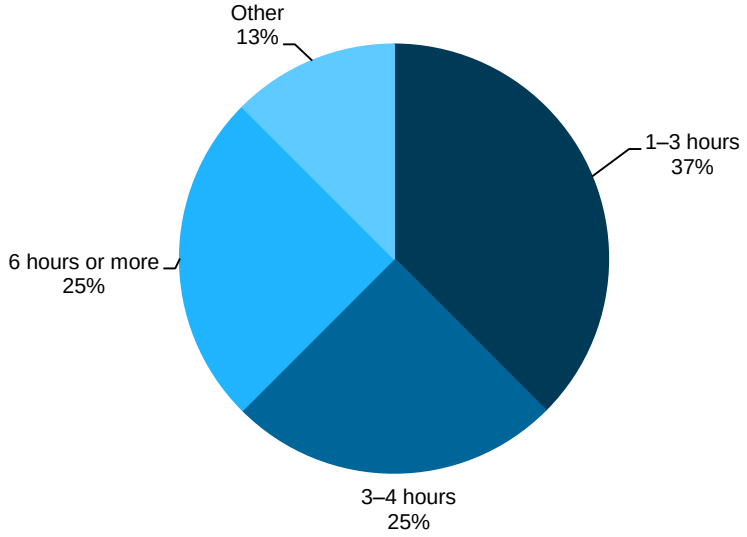
Separation

Around three-quarters of respondents (76%, 16 respondents) agreed that a timeframe should be used for defining separation. (Note: 2 respondents skipped this question, so percentages are based on the total number who responded to this question).

Of those who agreed, 6 (38%) supported '1–3 hours' as an appropriate and feasible timeframe. One respondent added that this should be 1–3 hours 'over the entire 24-hour period [following birth]', with the aim of keeping each episode of separation less at than 1 hour *(R10)*. The remaining respondents supported a '3–4 hour' time frame (25%, 4 respondents), '6 hours or more' (25%, 4) or another timeframe (13%, 2) (Figure B1).

One respondent who did not agree that a timeframe should be used to define separation commented that it was:

> 'Too hard to gather exact data on time of separation…If separation is necessary, data should be collected on the reason, including if the reason is insufficient staff to provide observation of mother and babe post-caesarean, neonatal blood tests or examinations, IV antibiotics etc'. (R18)



Source: Responses to AIHW 2013 National Core Maternity Indicators Questionnaire.

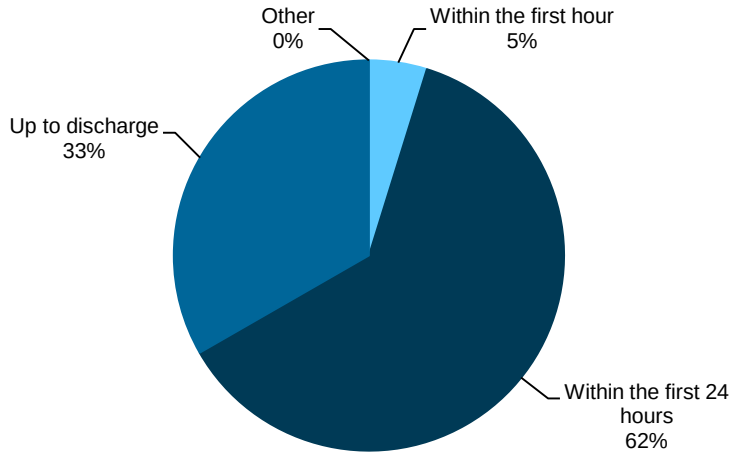
Figure B1: Preference for appropriate and suitable timeframe for measuring separation

After birth

The majority of respondents (62%, 13 respondents) reported that the period 'after birth' should be defined as the first 24 hours after birth. One-third of respondents (33%, 7)

supported 'Up to discharge', and 1 respondent (representing 5% of all respondents) supported 'Within the first hour' (Figure B2).

Respondents highlighted difficulties in collecting and comparing data with a time period of more than 24 hours, as significant differences in length of hospital stay could skew the results (R10 and R15).



Source: AIHW 2013 National Core Maternity Indicators Questionnaire.

Figure B2: Preference for how the time period 'after birth' should be defined

Additional care

A large majority of respondents (82%, 18 respondents) agreed with the proposed definition of 'additional care' (below). The proportions who 'somewhat agreed' and 'did not agree' were 9% each (2 in each group).

> Care not requiring admission to a special care nursery (level II nursery) or a neonatal intensive care nursery/unit (level III nursery) (based on the Australian and New Zealand Neonatal Network definitions below):
>
> - Level II refers to a nursery that generally has babies born at 32–36 weeks gestation weighing around 1,500 to 2,500 grams at birth. It includes care for babies who require intravenous therapy or antibiotics, and/or those who are convalescing after intensive care, and/or those who need their heart rate or breathing monitored, and/or those who need short-term oxygen therapy.
> - Level III or intensive care refers to the care of newborn infants who require more specialised care and treatment. It includes most babies born at less than 32 weeks gestation or less than 1,500 grams birthweight, and others who may require such interventions as intravenous feeding, and/or surgery, and/or cardiorespiratory monitoring for management of apnoea or seizures, and/or require assisted ventilation, and/or supplemental oxygen over 40% or long-term oxygen.

R11: 'This definition would appear to exclude babies who need only IV antibiotics, or regular observations. In some cases nursery admission would be appropriate, but in many places they could safely stay with their mother. What about phototherapy?'

R12: 'Access to on-call paediatricians 24 hrs for level 2a nurseries, Level 2b as above, in addition to access to clinical and diagnostic subspecialties Level 2b to include provision of short-term mechanical ventilation pending transfer (CPAP) with facilities for arterial blood

gas monitoring. Access to a specialist Senior Registered Nurse. Happy with Level 3 definition.'

R17: 'Some states now use six levels of care and levels 5 and 6 correspond to Levels 2 and 3.'

R22: 'Essential that admissions to NICU are collected and identified.'

R23: 'You should not have to always separate a baby from its mother just to give antibiotics.'

Types of additional care in scope

Five respondents provided valid responses regarding types of additional care that are not considered to require separation of the baby from the mother (types of care and number of respondents for each type summarised in Table B1).

Table B1: Responses on types of additional care in scope

Type **of additional care**	Number of respondents
Phototherapy/jaundice	4
IV antibiotics	4
Blood glucose measurement	3
Narcotic/drug withdrawal	2
Intrauterine growth restriction	1
Small for gestational age	1
Nasogastric intubation	1
Observation (not further defined)	1

R10: 'Phototherapy and drug withdrawal may need to be considered in the definition alongside IV antibiotics and blood glucose monitoring.'

R11: 'If this question means: which additional care should NOT exclude babies from this denominator? ...then phototherapy, observation, IV antibiotics, blood glucose measurement are all potential candidates. However it will vary from place to place, and depending on individual circumstances. If all of these are excluded we would have a comparable indicator, but would it be guiding care in the way intended?'

R13: 'Phototherapy for jaundice IV antibiotics for suspected sepsis but not requiring admission.'

R15: 'Treatment/observation for jaundice and narcotic withdrawal should be considered as to whether it is additional care in scope of the indicator.'

R18: 'Babies requiring serial BGLs, IV antibiotics, NG feeds, IUGR and SGA babies.'

R22: 'Essential that admissions to NICU are collected and identified.'

Restriction to babies born >37 completed weeks gestation

Most respondents (87%, 20 respondents) agreed that this indicator should be restricted to babies born at greater than 37 completed weeks gestation; 3 respondents (13%) did not support this restriction.

R6: 'Iatrogenic prematurity needs to be collected but this may be very difficult to determine in the data collection. There may be a philosophy of earlier delivery at one institution than another which should be captured, for example.' [did not support the restriction]

R7: '>/=.' [greater than or equal to; supported the restriction]

R18: 'More and more babies formerly cared for in SCN are in the PN wards or Labour wards (where there is 'bed block') and many of these are under 37 completed weeks. That this care is provided in PN areas is a good thing so mother–baby separation does not occur; however hospitals have to be funded and staffed to cover the extra human and material resources required.' [did not support the restriction]

R22: 'Always >= 37w; >37w might seem similar but is a major error.' [supported the restriction]

Detection of improved outcomes

More than half of respondents (57%, 13 respondents) agreed that it would be difficult to detect improved outcomes for this indicator, given babies receiving medical care on the wards do not attract hospital funding compared with those admitted to a nursery. Just over one-quarter of respondents somewhat agreed (26%, n=6) and 17% (n=4) of respondents disagreed.

R6: 'Money gets in the way of rational decisions always.' [Agreed]

R11: 'If that will affect the indicator greatly, its utility would be doubtful.' [Somewhat agreed]

R14: 'However, this is the reason for it being captured. We should not be separating babies from their mothers for financial reasons, only for clinical indications—most of which can now be managed on a postnatal ward whereas previously they were only provided in a nursery.' [Somewhat agreed]

R23: 'It's something that hospitals can manage with limited additional funding—it may even be cheaper!' [Disagreed]

Data collection

Regarding the best method of collection data for this indicator, 39% (7 respondents) supported the National Perinatal Data Collection, 39% (7) supported an 'other' mechanism and 22% supported an audit of labour ward records (Figure B3).

Comments from those who responded 'National Perinatal Data Collection' included:

R1: 'Wherever possible all data that is required for Nat Mat Indicators should be routinely-collected data items and the National Minimum Maternity Data should be revised accordingly.'

R18: 'NPDC is ideal, but the reality is this is not always accurate and relies on individual midwives at d/c [discharge] of mother and baby to review records to see if separation did occur. Also requires staff to record that a baby was taken from its mother for whatever reason in the clinical record since generally it would be impractical to enter this information on the NPDC at or around the time of separation.'

There were no comments from those who responded 'Audit of labour ward records'.

Comments from those who responded 'Other' included:

R5: 'Patient experience survey.'

R10: 'Clinical indicator with the hope that the information can be collected on local databases, as much of it is judgment. Complex to collect in NPDC and will need refining for specificity.'

R15: 'This type of indicator should be collected on on-site clinical databases by midwives. These data [are] then used to report and refine the indicator, its purpose and its ability to achieve the outcome expected. Collection in the NPDC should only be after some years of this type of collection and reporting.'

R11: 'Labour ward records would not help, as most of the period is spent away from [the] labour ward. If collected through NPDC, how would it be systematically collected? e.g. Would the mother be asked to answer the question as she leaves hospital? Would the midwife discharging the woman be expected to comb the baby's record? A pilot study would be informative.'

R14: 'Needs to be determined as part of this project.'

R16: 'Through ANZNN collection.'

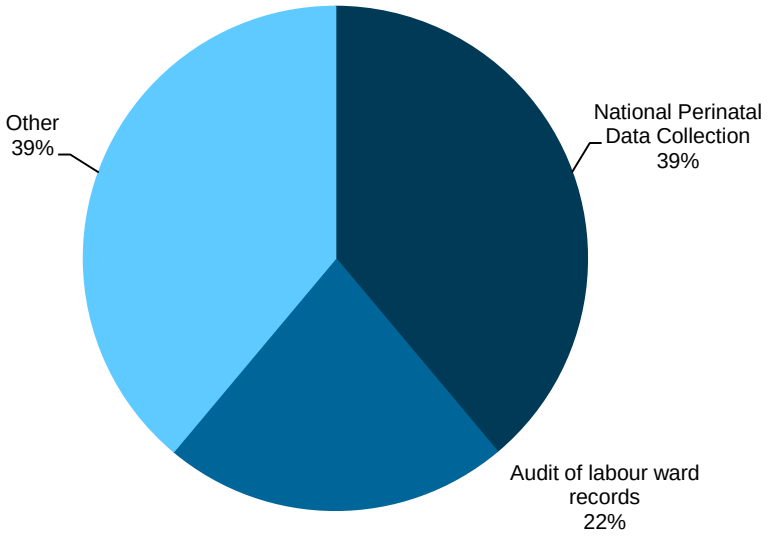
Comments from those who did not respond directly to the question of the best method of data collection were:

R17: 'Is there a role for ANZNN data collection to include this?'

R7: 'Unsure.'

R8: 'I think that data will be difficult to collect as it may not be routinely and reliably documented on current observation charts or entered into electronic maternity patient record databases. Making this an indicator may not be enough impetus for hospitals to change practice to document this information routinely.'

R23: 'This can probably best come from hospital discharge data.'



Source: Responses to AIHW 2013 National Core Maternity Indicators Questionnaire.

Figure B3: Preference for data collection method

NCMI 17: One-to-one care in labour

Background

ECG members discussed several issues and made several recommendations for defining this indicator, including its focus, before conducting the consultation with experts and stakeholders.

Results

Focus of indicator

Almost all respondents (96%, 21 respondents) agreed that the focus of this indicator should be about **continuous care** during labour (that is, having a midwife, rather than a nurse, present for the duration of labour and that a woman in labour is not left alone). This was further supported in comments from one respondent, who emphasised the weight of evidence for '*continuous midwifery care and support during labour*' (R18). Only 1 respondent disagreed (4% of respondents), but did not provide additional comment.

Respondents were further asked about the distinction between continuity of care versus continuity of carer. Specifically, the survey asked respondents whether they agreed or not with the statement that continuity of carer is not as important as continuity of care, noting that data on continuity of carer are very difficult to collect. Just over half of respondents agreed with the statement that continuity of carer is not as important (52%, 12 respondents), while 30% (7 respondents) and 17% (4) 'somewhat agreed' and 'disagreed' respectively. In their comments, respondents acknowledged the difficulty in collecting information on continuity of carer, as well as the practical issues involved in the same midwife providing continuous care for the duration of labour. They noted that while continuity of carer is ideal and desired by women, continuity of care is most important, and consistent care can be provided by multiple caregivers:

R6: 'Continuity of carer is important. It may be that there is some scope to doing this in individual hospitals and models of care should be included in outcomes. However, as a NCMI it would be difficult to capture due to the large number of models that are available. Does continuity of obstetric care at an elective c/s [caesarean section] count?' [Somewhat agreed]

R9: 'Standard guidelines for care to be followed by all. Birthing women treated with the same philosophy will be just as good as same caregiver.' [Agree]

R11: 'Importance and difficulty collecting are two different issues. Feasibility is also important. Have workforce stakeholders been consulted?' [Somewhat agree]

R17: 'Although common sense indicates that changing shifts should continue to occur, continuity of carer is sought by women.' [Disagree]

R18: 'Continuous care is paramount and having a known midwife provide that care is ideal. '[Somewhat agree]

Purpose of indicator

More than three-quarters of respondents (77%, 17 respondents) supported the proposed purpose of the indicator: 'To measure one-to-one midwifery care in labour, with the aim of optimising normal birth (that is, physiological birth) and minimising unnecessary interventions'.

Fourteen per cent (3 respondents) did not support the proposed purpose, and 9% (2) 'somewhat' supported it.

Additional comments were provided by 3 respondents. One respondent who did not provide an answer on agreement (or not) with the purpose made this comment:

R8: 'I think this data is difficult to collect.'

Another respondent was concerned that the purpose did not specifically address continuity of carer (following on from the previous question):

R22: 'Continuity of carer is very important and now about to be obscured.' [did not agree with the purpose]

The final comment highlighted that the aim is not just to optimise normal birth and minimise unnecessary interventions, but '… is also important for high-risk women who are having multiple interventions' [R23; did not agree with the purpose].

Definition of 'one-to-one care'

Respondents were provided with 2 specific options for the definition of one-to-one care, as well as the option 'Other', and asked to choose which they preferred (Table B2).

Table B2: Proposed definitions of 'one-to-one care'

Definition	Source	Preference—proportion (%) and no. of respondents
1 A woman in established labour receives care from an assigned midwife for the whole of that labour, or the midwife's whole shift, whichever is the shorter. This midwife will be available to care for the woman 100% of the time. At the end of the shift, if necessary, care will be handed over to another assigned midwife, who will continue the one-to-one care of that woman.	Based on the definition in London's Maternity Services: Commissioning Improvement Project guidance notes	64% (14)
2 The midwife has one woman allocated to her care and no other allocated responsibility.	Proposed by the Maternity Services Inter-Jurisdictional Committee	23% (5)
Other	—	14% (3)

Definition 1 received majority support at 64% (14 respondents).

Five respondents provided additional comments in relation to the definitions.

Two respondents who responded 'Other' supported Definition 2 with the qualification that it be expanded to include that the midwife is available to the assigned woman 100% of the time:

R10: 'Definition 2 is good but needs expanding to include 'and is with or available for that woman 100% of the time'.' [responded 'Other']

R15: 'Like Definition 2 better than Definition 1. But it needs to be extended to state the midwife is available to her assigned woman 100% of her time on shift.' [responded 'Other']

Other comments were as follows:

R9: 'Women receive standardised care even if by different caregivers. Unable to achieve 'same midwife' care in a busy labour ward.' [responded 'Other']

R11: 'They are essentially the same. If the midwife has any other allocated responsibility she is not available 100% of the time.' [responded 'Definition 2']

R18: 'You could shorten the first definition to include just the first two sentences if it was thought that it was 'a given' that if a woman was still in labour after her first midwife left, another midwife would replace her. Definition 2 would need the qualifier of one woman 'in established labour' allocated to her care and leave it like that. I think stipulating 'No other allocated responsibility' is tricky when we midwives all have a responsibility to the rest of our colleagues in terms of supporting them in emergency situations or providing guidance/support in the non-urgent situation, not to mention general 'housekeeping' without which all the women and staff in the labour ward are put at risk.' [responded 'Definition 1'].

Restriction to low-risk women

The majority of respondents (87%, 20 respondents) did not support the restriction of this indicator to low-risk women (that is, primiparas); only 13% (3) supported the restriction.

Comments were provided by 3 respondents, all of whom did not support the restriction. Two of the comments disputed that primiparas were low-risk (R7 and R11), and one respondent noted that regardless of whether primiparas or multiparous, [or] low or high risk, all would benefit from one-to-one care (R11). The third respondent emphasised that one-to-one care is even more important for high-risk women:

R18: 'Ideally all women in established labour should receive one-to-one midwifery, and high-risk women probably need that support even more—having them strapped to every bit of machinery possible does not replace midwifery!'

Data collection

In terms of data collection, almost all respondents agreed that the best mechanism was through the midwife completing the labour ward summary (96%, 22 respondents). Three respondents provided supporting comments:

R1: 'And again added to Nat Mat Min Data set.'

R15: 'Only person who knows the information.'

R18: 'And the clinical record where more than one midwife (that is, 'shift' of midwives) has cared for the woman in labour.'

Only 1 respondent (4%) proposed a different mechanism:

R11: 'There would need to be a question at the end of each shift (something like 'Since you took over the care of this woman, did you have any other allocated patient?'). The midwife completing the form would know what had happened on earlier shifts.'

NCMI 18: Caesarean sections <39 weeks (273 days) without obstetric/medical indication

Background

ECG members discussed the need to develop a list of indications that may justify early caesarean section (CS) prior to 39 completed weeks gestation. The National Maternity Data Development Project (NMDDP) has developed a list of indications for caesarean section for inclusion in the National Perinatal Data Collection. Although not specific to deliveries prior to 39 weeks gestation, this list could provide relevant data for this indicator.

Results

Title of indicator

Around three-quarters of respondents (77%, 17 respondents) agreed with the proposed title for this indicator: 'Caesarean sections <39 weeks (273 days) without obstetric/medical indication'. A further 14%(3 respondents) 'somewhat agreed' with the title and 9% (2) did not agree. Five respondents provided further comments as follows:

- Two respondents provided additional comments regarding the gestation period (R22 provided multiple comments on this issue):

  R14: 'Need to include a lower gestation too, i.e. term CS <39 weeks otherwise will capture preterm CS (although these would have a medical indication I suppose)'

  R22: 'Should be less than 38.4 weeks gestation. Elective CS is ideally at 39 weeks but few units can schedule on that day. Going beyond 39 weeks is just as bad as being early by a few days. RANZCOG recommend 'approximately 39 weeks' to allow for this. Less than 39.4 weeks would cover this issue adequately, less than 39 weeks is simply wrong and encouraging bad practice (that is, delaying till 39 and a few days when 39 is not possible because of scheduling issues).'

R22: '…Very disappointing to be obsessed with <39w when delivery at 'approximately 39w' is the recommendation—even in the absence of additional risk factors for perinatal morbidity and mortality.'

- One respondent suggested the addition of 'completed' to the timeframe, such that it would read 'to <39 completed weeks'. (R20)
- The remaining 2 comments related to definitional issues for the Indicator rather than its title, and are therefore included in more relevant sections below.

Purpose of indicator

A large majority of respondents (86%, 19 respondents) supported this proposed purpose of the indicator: 'Neonatal respiratory morbidity can be reduced by minimising early delivery. This indicator is used to benchmark practice'.

Additional comments on the purpose of the indicator were provided by 5 respondents:

R7: 'Data presented at FIGO [International Federation of Gynecology and Obstetrics] from UK suggested that this presumption is not valid in a prospective study—not seen in print yet but potentially important.'

R17: 'It is not simply respiratory morbidity that increases with decreasing gestational age. Many organs undergo maturation shortly before natural birth. Neonatal jaundice is another example.'

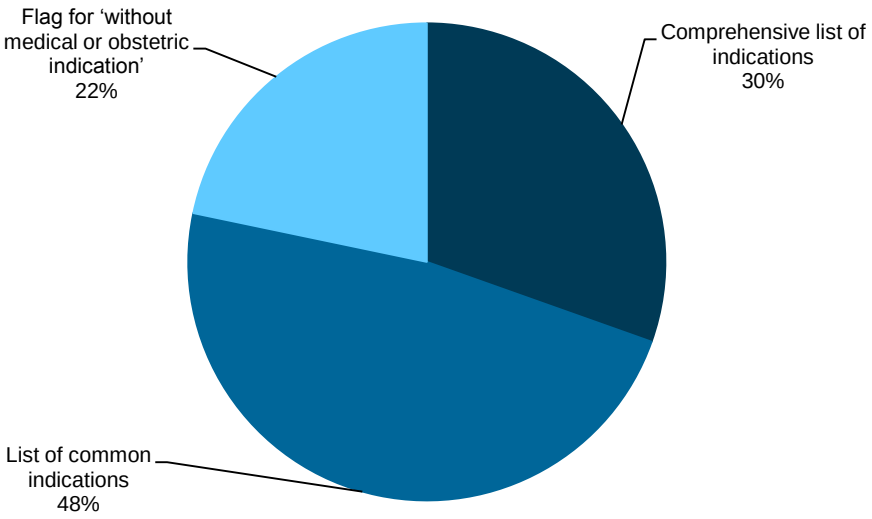
R19: 'Please use birth rather than delivery.'

R22: 'Need to also say this has to be balanced against the increased rates of death and disability by delaying the delivery. 'Approximately 39 weeks' achieves this balance.'

R23: 'There are many other reasons for trying to minimise early delivery without a good reason.'

Method of listing or recording indications that may justify caesarean section delivery prior to 39 completed weeks gestation

Three options were presented (see Figure B4). The most common preference to capture indications that may justify caesarean section delivery prior to 39 completed weeks gestation was 'List of common indications based on the NMDDP list of indications for caesarean section' (48%, 11 respondents). This was followed by the 'Comprehensive list of indications based on ICD-10-AM' (30%, 7) and the 'Flag for 'without medical or obstetric indication'' (22%, 5) (Figure B4).



Notes

1. Comprehensive list of indications is based on ICD-10-AM codes.
2. List of common indications is based on the NMDDP list of indications for caesarean section.
3. Flag for 'without medical or obstetric indication' (using only code 19 'Maternal choice in the absence of any obstetric or medical (including psychological) indications' from the NMDDP list of indications).

Source: Responses to AIHW 2013 National Core Maternity Indicators Questionnaire.

Figure B4: Preferred method to list or record indications that may justify caesarean section delivery prior to 39 completed weeks gestation

Several respondents provided comments in full or partial support of the NMDDP:

R1: 'For consistency and reduction in confusion, use NMDDP list.'

R11: 'Only planned CSs before labour are relevant here. Would not necessarily need a list of ICD-10 codes—general indications would suffice, for example 1, 7, 8, 9, 10, ?11, 17 on the NMDDP list. Is not the intent to delay all non-urgent CS until a safer gestation? The NMDDP includes a number of indications that should be included here, for example repeat CS, malpresentation, previous shoulder dystocia, macrosomia, previous perineal trauma and maternal choice (the 'fail to progress' ones—unsuccessful attempt at assisted delivery, unsuccessful induction—are irrelevant).'

One respondent provided a comment in relation to the unsuitability of the ICD-10-AM codes:

R6: 'In reality there are a number of indications that might not be able to fit into ICD-10-AM codes...or a combination of reasons and this may seem too prescriptive.'

Other respondents raised more general issues in relation to the method:

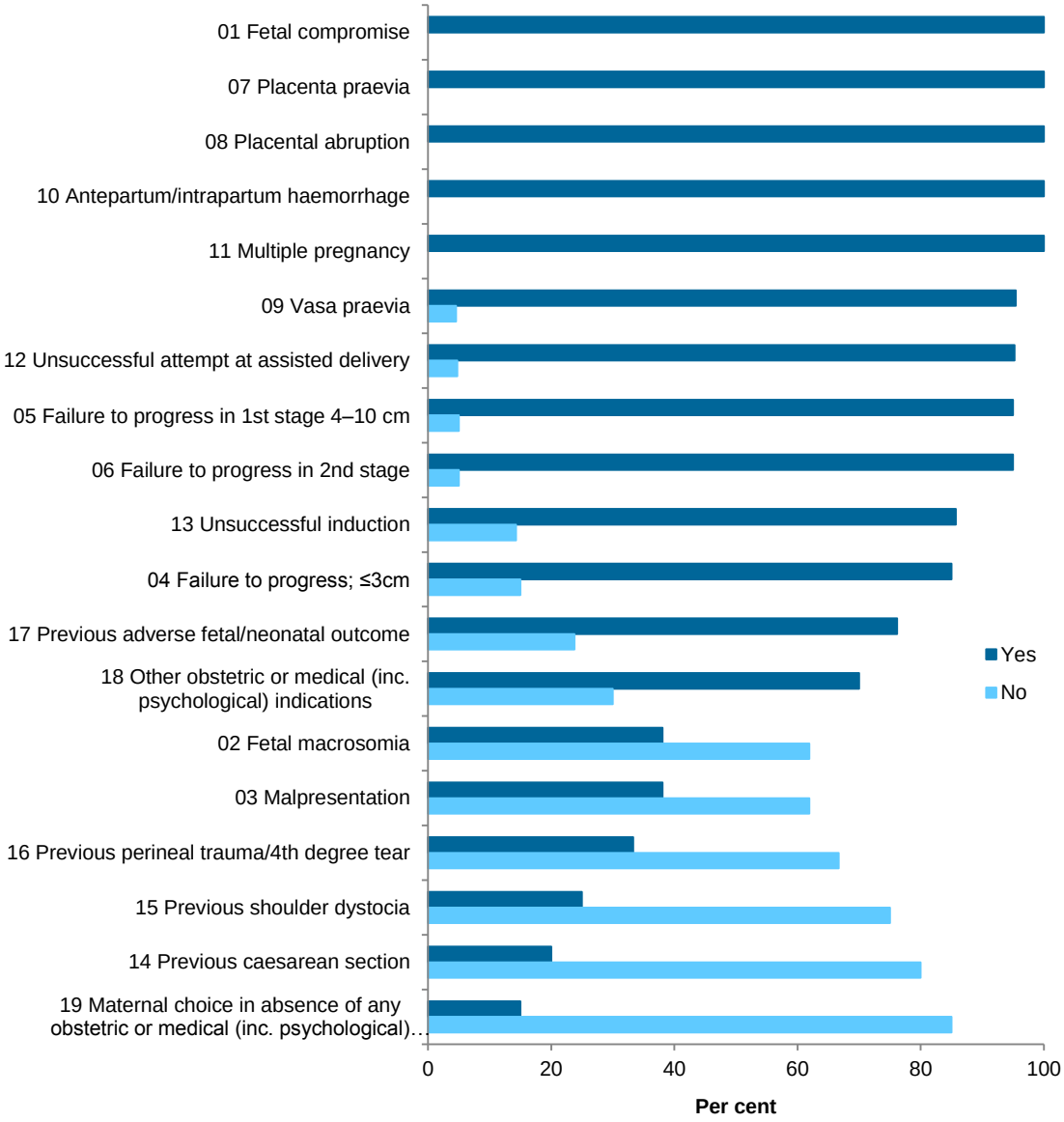
R17: 'Does 'other obstetric indications' include obstetricians choice?'

R22: 'Impossible to be comprehensive, <39w is incorrect terminology anyway.'

R23: 'The problem with any of these is that maternal choice will always be labelled as 'psychological'.'

Indications justifying caesarean section delivery prior to 39 completed weeks gestation

Figure B5 shows the level of support for each of the proposed indications. Table B3 groups the indications into categories based on the level of support.



Source: Responses to AIHW 2013 National Core Maternity Indicators Questionnaire.

Figure B5: Indications for caesarean section at <39 weeks gestation

Table B3: Support for indications justifying caesarean section at <39 weeks gestation

Low support	Moderate support	Strong support	Very strong support
14 Previous caesarean section (20%, 4 respondents)	02 Fetal macrosomia (38%, 8 respondents)	17 Previous adverse fetal/neonatal outcome (76%, 16 respondents)	01 Fetal compromise (includes suspected or actual fetal compromise and IUGR) (100%, 22 respondents)
15 Previous shoulder dystocia (25%, 5)	03 Malpresentation (38%, 8)		
19 Maternal choice in the absence of any obstetric or medical (including psychological) indications (15%, n=3)	16 Previous perineal trauma/4th degree tear (33%, n=7)	18 Other obstetric or medical (including psychological) indications (70%, 14)	04 Failure to progress; ≤3cm (prolonged latent phase) (85%, 17)
			05 Failure to progress in the first stage 4–10 cm (95%, 19)
			06 Failure to progress in the second stage (95%, 19)
			07 Placenta praevia (100%, 22)
			08 Placental abruption (100%, 2)
			09 Vasa praevia (95%, 1)
			10 Antepartum/intrapartum haemorrhage (100%, 22)
			11 Multiple pregnancy (100%, 22)
			12 Unsuccessful attempt at assisted delivery (95%, 20)
			13 Unsuccessful induction (86%, 8)

Note: Low support (0% to 29%); Moderate support (30% to 59%); Strong support (60% to 79%); Very strong support (80% to 100%).

Source: Responses to AIHW 2013 National Core Maternity Indicators Questionnaire.

The most common theme in the comments received on the list of indications was regarding the distinction between pre-labour and labour indications. Several respondents believed that the labour indications do not apply to this indicator and should be excluded, as the indicator relates only to planned caesarean sections prior to 39 completed weeks gestation (rather than elective).

R1: 'Needs to be clear that the indicator refers to pre-labour CS, the above indications of course refer to all CSs and therefore the 'intrapartum' indicators per se do not apply.'

R6: 'This is again a difficult question to answer as there are lots of times that some of these would apply and some that don't depending on the circumstances. Not sure what is meant by ftp labour 4–10 cms.....are they supposed to go home? Suggest take out the labour versus non-labour reasons. Some of the answers will depend on what gestation the previous event occurred and the circumstances.'

R11: 'Only planned CSs before labour are relevant here. The fail to progress ones, unsuccessful attempt at assisted delivery, unsuccessful induction are irrelevant as they are not pre-labour.'

Consistent with these comments, 2 respondents emphasised the inclusion of several non-labour codes:

R10: 'Think that codes 02, 03, 11, 14, 15, 16 and 17 should be included in this indicator as they are not reasons for elective C/S pre 39 weeks.'

R15: 'Like this indicator but should include reason for CS items 03, 11, 14, 15 or 16 as these should not be done before 39 weeks either.'

Other comments received on the list of indications were:

R3: 'I would also suggest to include placenta accrete.'

R8: 'Previous shoulder dystocia is a difficult one as I would think this is a valid reason for caesarean section if the infant is significantly larger than the one where there is a shoulder dystocia but I would not necessarily undertake the c/section before 39/40.'

R17: 'Can psychological and psychiatric reasons be separated from obstetric?'

R18: 'MAY is the operative word—pun intended! Malpresentation may right itself by the time labour starts, who determines 'macrosomia' and at what gestation, who counsels the woman who wants a c/s because she had one last time, how real (that is, well documented) was the previous shoulder dystocia ???? I could go on.'

R20: 'Fetal macrosomia is difficult—I don't feel strongly either way.'

R22: 'All reasonable. '

Proposed new NCMI: Skin-to-skin contact between mother and baby after birth

Background

During the discussion of NCMI 16, 'Separation of baby from the mother after birth for additional care', ECG members noted the importance of skin-to-skin contact and recommended it be developed as an additional indicator.

Results

The majority of respondents (78%, 18 respondents) supported the development of a new indicator to measure skin-to-skin contact between mother and baby after birth. Thirteen per cent (3 respondents) 'somewhat supported' the development of the indicator and 9% (2) did not support it.

Five additional comments were received, four of which offered support for the indicator, citing the following justifications:

- Already collected by many sites for BFHI (Baby-Friendly Health Initiative), and would be useful to obtain private hospital data for comparison.
- Good evidence for benefit.
- Relatively easy to collect.

One comment from a respondent who 'somewhat' supported the indicator questioned its value as a clinical indicator (R23).

No additional comments were received from respondents who did not support the development of this indicator.

Purpose of indicator

The large majority of respondents (91%, 20 respondents) supported the proposed purpose of the indicator: 'Placing the baby in skin-to-skin contact with the mother immediately after

birth promotes mother–baby attachment and breastfeeding. This indicator is used to benchmark practice'.

Only 1 respondent did not support the purpose, and 1 respondent 'somewhat' supported the purpose, stating that 'It is a reasonable definition' (R23).

Timeframe for skin-to-skin contact

There was very strong agreement that the timeframe for skin-to-skin contact should be within 60 minutes of birth (95%, 21 respondents). Only 1 respondent disagreed but did not provide additional comment.

One respondent suggested that within 30 minutes would be even better, but expected high failure rates (R18).

Another respondent highlighted definitional issues about the amount of time required for skin-to-skin contact within this 60 minute period:

R11: 'But how much time spent in skin-to-skin contact would qualify as a 'yes'? Would 1 minute suffice? Presumably not, but what is the minimum portion of the first 60 minutes that would qualify as a 'yes'?'

Data collection

There was very strong support (95%, 19 respondents) for collecting the data through the midwife's completing of the labour ward summary. Two additional comments were received in support of this:

> R15: 'Best person to know the answer.'
>
> R18: 'The midwife present at the birth and afterwards (presumably the midwife who completes the summary) is the most appropriate person to collect the data.'

One respondent commented that these data should also be added to the National Minimum Data Set (R1).

A respondent who did not provide a response in relation to the preferred method of data collection stated that it would be 'Difficult to collect data as this may not be documented. If collecting this data this indicator should be collected for babies 37 weeks gestation onwards and data grouped separately for vaginal and caesarean section births' (R8).

A respondent who did not support the development of this indicator commented that this data should not be collected (R22).

General comments

Four respondents provided additional general comments on the indicators (under development). One respondent expressed concern over the ability to consistently and reliably report on the indicators, as well as around definitional issues:

> R8: 'I think the indicators need more work. I think these indicators are looking at data that may not be consistently or reliably documented, coded by medical records or fields in maternity electronic medical records, so returns on these indicators at present are limited. Also, there needs to be clearer definition of these indicators and coding criteria for it to work.'

Two respondents were interested to know how the indicators would be collected and reported, and the forum for reporting the results:

R10: 'Interested to know how these indicators will be collected or reported and at which forums the results will be reported.'

R15: 'Interested to know what forums will be receiving reports of these indicators and at what level they will be required to be collected and reported, that is, site, jurisdiction or just AIHW.'

A final respondent expressed support for the indicator development process to fix issues of nomenclature:

> R18: 'I think I have probably said enough, but, at the risk of being boring, this is a golden opportunity to fix nomenclature—I know it is hard and there are lots of data collection lists that would have to be changed, but it would make such a difference to our birthing culture. Thanks for 'listening'!'

Appendix C: Draft technical specifications

Skin-to-skin contact between mother and baby after birth

Indicator details

Description	The proportion of babies placed in skin-to-skin contact with the mother immediately after birth.
Purpose	Placing the baby in skin-to-skin contact with the mother immediately after birth promotes mother–baby attachment and breastfeeding. This indicator is used to benchmark practice.
Numerator	The number of babies placed in skin-to-skin contact with the mother after birth.
Denominator	The number of live babies born.
Computation/Presentation	Numerator/denominator x 100
Presentation	Percentage
Notes and exceptions	A birth is defined as the event in which a baby comes out of the uterus after a pregnancy of at least 20 weeks gestation or weighing 400 grams or more. If the baby is alive the birth is a live birth. If the baby is not alive the birth is a stillbirth. 'After birth' is defined as within 5 minutes following the birth event. If this is not possible for medical reasons following a caesarean section, skin-to-skin contact should be initiated within 10 minutes of arriving in recovery. In the case of general anaesthesia, skin-to-skin contact should be initiated within 10 minutes of the mother being able to respond to her baby. Births excluded are stillbirths.

Data collection details

Data source	To be determined
Data source type	To be determined
Data items—indicator	To be determined
Data items—disaggregation factors	To be determined
Frequency of data source collection(s)	To be determined

Additional details

Comments	

18. Caesarean section <39 weeks (273 days) without obstetric/medical indication

Indicator details

Description	The proportion of women who gave birth by caesarean section at less than 39 completed weeks (273 days) gestation without obstetric/medical indication.
Purpose	Neonatal respiratory morbidity can be reduced by minimising early delivery. This indicator is used to benchmark practice.
Numerator	The number of women who gave birth by caesarean section at less than 39 completed weeks (273 days) gestation without obstetric/medical indication.
Denominator	The number of women who gave birth by caesarean section at less than 39 completed weeks (273 days) gestation.
Computation/Presentation	Numerator/denominator x 100
Presentation	Percentage
Notes and exceptions	A birth is defined as the event in which a baby comes out of the uterus after a pregnancy of least 20 weeks gestation or weighing 400grams or more. Births included are caesarean deliveries (where there was no labour) at <39 completed weeks (273 days). Births excluded are: • caesarean deliveries at or after 39 completed weeks (273 days) gestation • where there was labour • all vaginal deliveries • those delivered pre-term by caesarean section (where there was no labour) for the following indications: – fetal compromise – placenta praevia – placental abruption – vasa praevia – antepartum/intrapartum haemorrhage – multiple pregnancy – other obstetric, medical, surgical, psychological indications.

Data collection details

Data source	National Perinatal Data Collection
Data source type	Perinatal NMDS and voluntarily-supplied items
Data items—indicator	Gestational age Method of birth Onset of labour Main indication for caesarean section
Data items—disaggregation factors	To be determined
Frequency of data source collection(s)	Annual

Additional details

Comments	

Appendix D: Indications for pre-term caesarean sections

Table D1: Conditions possibly justifying elective delivery prior to 39 weeks gestation

ICD-9-CM code	Shortened description	ICD-9-CM code	Shortened description
042	HUMAN IMMUNO VIRUS DIS	648.61	CV DIS NEC PREG-DELIVER
641.01	PLACENTA PREVIA-DELIVER	648.62	CV DIS NEC-DELIVER W P/P
641.11	PLACENTA PREV HEM-DELIV	648.81	ABN GLUCOSE TOLER-DELIV
641.21	PREM SEPAR PLACEN-DELIV	648.82	ABN GLUCOSE-DELIV W P/P
641.31	COAG DEF HEMORR-DELIVER	649.31	COAGULATION DEF-DELIV
641.81	ANTEPARTUM HEM NEC-DELIV	649.32	COAGULATN DEF-DEL W P/P
641.91	ANTEPARTUM HEM NOS-DELIV	651.01	TWIN PREGNANCY-DELIVERED
642.01	ESSEN HYPERTEN-DELIVERED	651.11	TRIPLET PREGNANCY-DELIV
642.02	ESSEN HYPERTEN-DEL W P/P	651.21	QUADRUPLET PREG-DELIVER
642.11	RENAL HYPERTEN PG-DELIV	651.31	TWINS W FETAL LOSS-DEL
642.12	RENAL HYPERTEN-DEL P/P	651.41	TRIPLETS W FET LOSS-DEL
642.21	OLD HYPERTEN NEC-DELIVER	651.51	QUADS W FETAL LOSS-DEL
642.22	OLD HYPERTEN-DELIV W P/P	651.61	MULT GES W FET LOSS-DEL
642.31	TRANS HYPERTEN-DELIVERED	651.71	MULT GEST-FET REDUCT DEL
642.32	TRANS HYPERTEN-DEL W P/P	651.81	MULTI GESTAT NEC-DELIVER
642.41	MILD/NOS PREECLAMP-DELIV	651.91	MULT GESTATION NOS-DELIV
642.42	MILD PREECLAMP-DEL W P/P	652.01	UNSTABLE LIE-DELIVERED
642.51	SEVERE PREECLAMP-DELIVER	652.61	MULT GEST MALPRES-DELIV
642.52	SEV PREECLAMP-DEL W P/P	655.01	FETAL CNS MALFORM-DELIV
642.61	ECLAMPSIA-DELIVERED	655.11	FETAL CHROMOSO ABN-DELIV
642.62	ECLAMPSIA-DELIV W P/P	655.31	FET DAMG D/T VIRUS-DELIV
642.71	TOX W OLD HYPERTEN-DELIV	655.41	FET DAMG D/T DIS-DELIVER
642.72	TOX W OLD HYP-DEL W P/P	655.51	FET DAMAG D/T DRUG-DELIV
642.91	HYPERTENS NOS-DELIVERED	655.61	RADIAT FETAL DAMAG-DELIV
642.92	HYPERTENS NOS-DEL W P/P	655.81	FETAL ABNORM NEC-UNSPEC
646.21	RENAL DIS NOS-DELIVERED	656.01	FETAL-MATERNAL HEM-DELIV

(continued)

Table D1 (continued): Conditions possibly justifying elective delivery prior to 39 weeks gestation

ICD-9-CM code	Shortened description	ICD-9-CM code	Shortened description
646.22	RENAL DIS NOS-DEL W P/P	656.11	RH ISOIMMUNIZAT-DELIVER
646.71	LIVER/BIL TRCT DISR-DEL	656.21	ABO ISOIMMUNIZAT-DELIVER
648.01	DIABETES-DELIVERED	656.31	FETAL DISTRESS-DELIVERED
648.51	CONGEN CV DIS-DELIVERED	656.41	INTRAUTER DEATH-DELIVER
648.52	CONGEN CV DIS-DEL W P/P	656.51	POOR FETAL GROWTH-DELIV
657.01	POLYHYDRAMNIOS-DELIVERED	659.71	ABN FTL HRT RATE/RHY-DEL
658.01	OLIGOHYDRAMNIOS-DELIVER	663.51	VASA PREVIA-DELIVERED
658.11	PREM RUPT MEMBRAN-DELIV	V08	ASYMP HIV INFECTN STATUS
658.21	PROLONG RUPT MEMB-DELIV	V23.5	PREG W POOR REPRODUCT HX
658.41	AMNIOTIC INFECTION-DELIV	V27.1	DELIVER-SINGLE STILLBORN

Source: US Joint Commission 2012. Table 11.07, Appendix A, Specifications Manual for Joint Commission National Quality Core Measures (v2012b).

Table D2: Recommendations for the timing of delivery when conditions complicate pregnancy at or after 34 weeks of gestation

Condition	General timing	Suggested specific timing
Placental/uterine issues		
Placenta praevia*	Late preterm/early-term	36 0/7–37 6/7 weeks of gestation
Placenta praevia with suspected accreta, increta, or percreta*	Late preterm	34 0/7–35 6/7 weeks of gestation
Prior classical caesarean	Late preterm/early-term	36 0/7–37 6/7 weeks of gestation
Prior myomectomy	Early-term/term (individualise)	37 0/7–38 6/7 weeks of gestation
Fetal issues		
Growth restriction (singleton)		
Otherwise uncomplicated, no concurrent findings	Early-term/term	38 0/7–39 6/7 weeks of gestation
Concurrent conditions (oligohydramnios, abnormal Doppler studies, maternal co-morbidity [e.g. pre-eclampsia, chronic hypertension])	Late preterm/early-term	34 0/7–37 6/7 weeks of gestation
Growth restriction (twins)		
Di–Di twins with isolated fetal growth restriction	Late preterm/early-term	36 0/7–37 6/7 weeks of gestation
Di–Di twins with concurrent condition (abnormal Doppler studies, maternal co-morbidity [e.g. pre-eclampsia, chronic hypertension])	Late preterm	32 0/7–34 6/7 weeks of gestation
Mo–Di twins with isolated fetal growth restriction	Late preterm	32 0/7–34 6/7 weeks of gestation
Multiple gestations		
Di–Di twins	Early-term	38 0/7–38 6/7 weeks of gestation
Mo–Di twins	Late preterm/early-term	34 0/7–37 6/7 weeks of gestation
Oligohydramnios	Late preterm/early-term	36 0/7–37 6/7 weeks of gestation
Maternal issues		
Chronic hypertension		
Controlled on no medications	Early-term/term	38 0/7–39 6/7 weeks of gestation
Controlled on medications	Early-term/term	37 0/7–39 6/7 weeks of gestation
Difficult to control	Late preterm/early-term	36 0/7–37 6/7 weeks of gestation
Gestational hypertension	Early-term	37 0/7–38 6/7 weeks of gestation
Pre-eclampsia–severe	Late preterm	At diagnosis after 34 0/7 weeks of gestation
Pre-eclampsia–mild	Early-term	At diagnosis after 37 0/7 weeks of gestation
Diabetes		
Pregestational well-controlled*	Late preterm, early-term birth not indicated	
Pregestational with vascular complications	Early-term/term	37 0/7–39 6/7 weeks of gestation
Pregestational, poorly controlled	Late preterm or early-term	Individualised
Gestational – well controlled on diet or medications	Late preterm, early-term birth not indicated	
Gestational – poorly controlled	Late preterm or early-term	Individualised

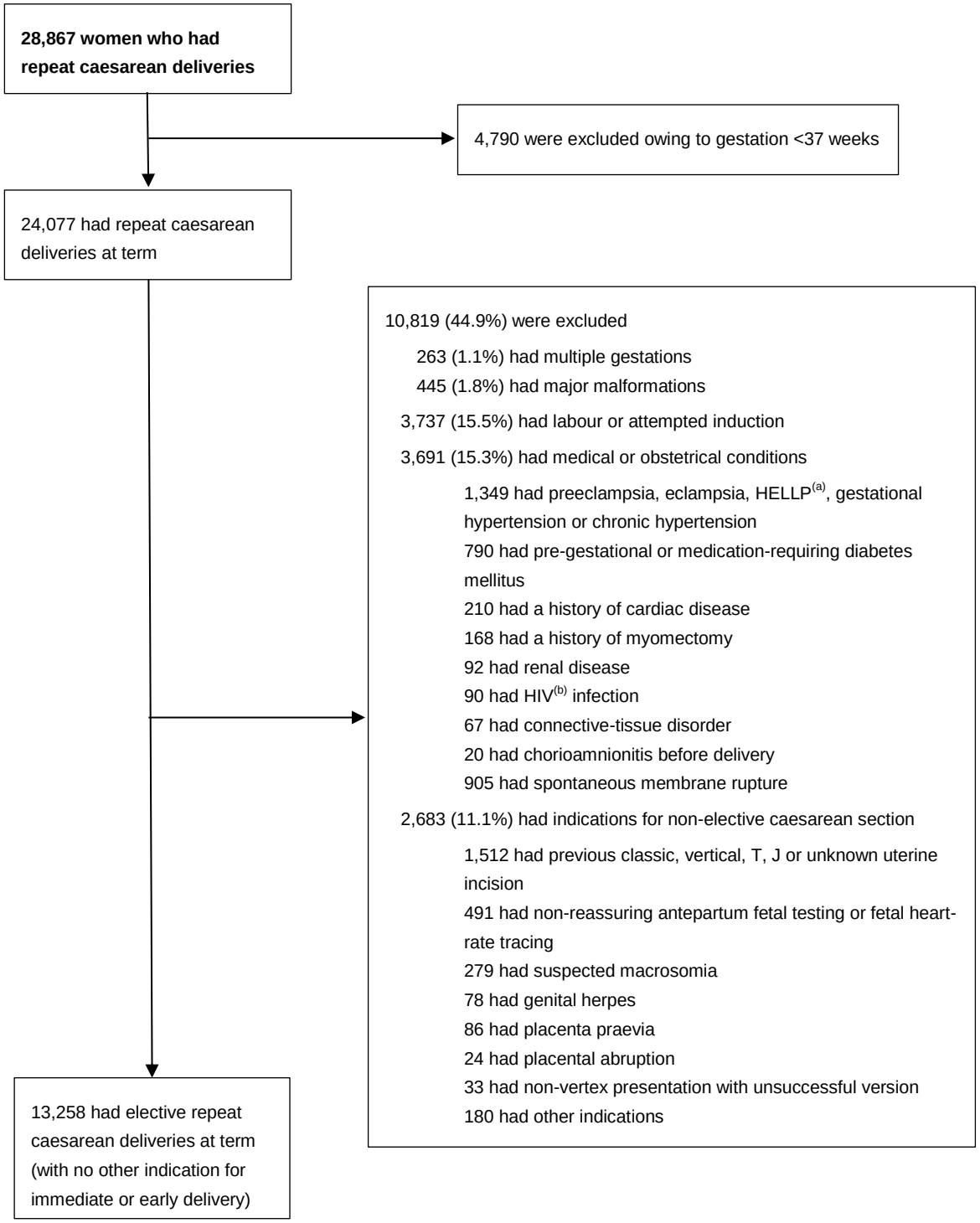
(continued)

Table D2 (continued): Recommendations for the timing of delivery when conditions complicate pregnancy at or after 34 weeks of gestation

Condition	General timing	Suggested specific timing
Obstetric issues		
PPROM	Late preterm	34 0/7 weeks of gestation

Abbreviations: Di–Di=dichorionic–diamniotic; Mo–Di=monochorionic–diamniotic; PPROM=preterm premature rupture of membranes.
*Uncomplicated, thus no fetal growth restriction, superimposed preeclampsia, or other complications. If these are present, then the complicating conditions take precedence and earlier delivery may be indicated.

Source: ACOG 2013. Committee Opinion number 560. Medically indicated late-preterm and early-term deliveries.



(a) HELLP denotes haemolysis, elevated liver-enzyme levels and low platelet count.

(b) HIV human immunodeficiency virus.

Source: Tita et al. 2009.

Figure D1: Flowchart detailing exclusion criteria applied to identify elective caesarean sections

Glossary

Antenatal: The period covering conception up to the time of birth. Synonymous with *prenatal*.

Birth: An event in which a baby comes out of the uterus after a pregnancy of at least 20 weeks gestation or weighing 400 grams or more.

Birthweight: The first weight of the baby (stillborn or liveborn) obtained after birth (usually measured to the nearest 5 grams and obtained within one hour of birth).

Caesarean section: An operative procedure to remove the baby through a cut through the woman's abdomen and uterus.

Congenital: A condition that is recognised at birth, or that is believed to have been present since birth, including conditions that are inherited or caused by environmental factors.

Diabetes (diabetes mellitus): A chronic condition in which the body cannot properly use its main energy source, the sugar glucose. This is due to a relative or absolute deficiency in insulin, a hormone that is produced by the pancreas and helps glucose enter the body's cells from the bloodstream and then be processed by them. Diabetes is marked by an abnormal build-up of glucose in the blood, and it can have serious short- and long-term effects.

Fetal death (stillbirth): Death before the complete expulsion or extraction from its mother of a product of conception of 20 or more completed weeks of gestation or of 400 grams or more birthweight. The death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles.

First degree laceration: Graze, laceration, rupture or tear of the perineal skin during delivery that may be considered to be slight or that involves fourchette, labia, vagina or vulva.

Fourth degree laceration: Perineal laceration, rupture or tear as in third degree laceration occurring during delivery also involving anal mucosa or rectal mucosa.

Gestational age: The duration of pregnancy in completed weeks, calculated from the date of the first day of a woman's last menstrual period and her baby's date of birth, or via ultrasound, or derived from clinical assessment during pregnancy or from examination of the baby after birth.

Gestational diabetes: A form of diabetes that is first diagnosed during pregnancy (gestation). It may disappear after pregnancy, but signals a high risk of diabetes occurring later on.

High blood pressure/hypertension: The definition of high blood pressure (also known as hypertension) can vary, but a well-accepted one is from the World Health Organization: a systolic blood pressure of 140 mmHg or more or a diastolic blood pressure of 90 mmHg or more, or [the person is] receiving medication for high blood pressure.

Indigenous: A person of Aboriginal and/or Torres Strait Islander descent who identifies as an Aboriginal and/or Torres Strait Islander.

Induction of labour: Labour started by artificial means.

Intrauterine growth restriction: Poor growth of a fetus during pregnancy that is detected clinically during pregnancy or after birth.

Labour: The physiological process by which a vaginal birth occurs that commences at the onset of regular uterine contractions that act to produce progressive cervical dilatation, and is distinct from spurious labour or pre-labour rupture of membranes.

Live birth: The complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each product of such a birth is considered liveborn (WHO definition).

Parity: Number of previous pregnancies resulting in live births or stillbirths, excluding the current pregnancy.

Perinatal: Pertaining to, or occurring in, the period shortly before or after birth (usually up to 28 days after).

Pre-term birth: Birth from 20 weeks and before 37 weeks gestational age.

Primipara: A woman who has given birth for the first time.

Second degree laceration: Perineal laceration, rupture or tear as in first degree laceration occurring during delivery also involving pelvic floor, perineal muscles or vaginal muscles.

Term: Pregnancy duration between 37 and 41 weeks of gestational age.

Third degree laceration: Perineal laceration, rupture or tear as in second degree laceration occurring during delivery also involving anal floor, rectovaginal septum, or sphincter not otherwise specified (NOS).

References

ACHS (Australian Council on Healthcare Standards) 2013a. Clinical indicator user manual for data collected in 2H2013: Obstetrics version 7.2. Viewed 10 October 2014, <http://www.ranzcog.edu.au/documents/doc_download/267-obstetric-indicators.html>.

ACHS 2013b. Obstetrics version 7. Retrospective data in full. Australasian Clinical Indicator Report 2005–2012. Sydney: ACHS.

ACOG (American College of Obstetricians and Gynecologists) 2013. Committee Opinion number 560. Medically indicated late-preterm and early-term deliveries. Viewed 3 June 2013, <http://www.acog.org/Resources_And_Publications/Committee_Opinions/Committee_on_Obstetric_Practice/Medically_Indicated_Late-Preterm_and_Early-Term_Deliveries>.

AHMC (Australian Health Ministers' Conference) 2011. National Maternity Services Plan 2010. Canberra: Australian Government Department of Health and Ageing.

AIHW (Australian Institute of Health and Welfare) 2011. 2010 Australian national infant feeding survey: indicator results. Cat. no. PHE 156. Canberra: AIHW.

AIHW NPESU (National Perinatal Epidemiology and Statistics Unit) & AIHW 2013. National core maternity indicators. Cat. no. PER 58. Canberra: AIHW.

Barnett CR, Leiderman PH, Grobstein R & Klaus M 1970. Neonatal separation: the maternal side of interactional deprivation. Pediatrics 45:197–205.

Bates SM, Greer IA, Pabinger I, Sofaer S & Hirsh J 2008. Venous thromboembolism, thrombophilia, antithrombotic therapy, and pregnancy. American College of Chest Physicians evidence-based clinical practice guidelines (8th edition). Chest 133:844S–66S.

Bystrova K, Widström AM, Matthiesen AS, Ransjö-Arvidson AB, Welles-Nyström B, Vorontsov I et al. 2007. Early lactation performance in primiparous and multiparous women in relation to different maternity home practices. A randomised trial in St. Petersburg. International Journal of Breastfeeding 2:9.

Bystrova K, Ivanova V, Edhborg M, Matthiesen AS, Ransjö-Arvidson AB, Mukhamedrakhimov R et al. 2009. Early contact versus separation: effects on mother–infant interaction one year later. Birth 36:97–109.

Clark SL, Miller DD, Belfort MA, Dildy GA, Frye DK & Meyers JA 2009. Neonatal and maternal outcomes associated with elective term delivery. American Journal of Obstetrics and Gynecology 200:156.e1–4.

Clark SL, Meyers JA & Perlin JB 2012. Oversight of elective term deliveries: avoiding unintended consequences. American Journal of Obstetrics and Gynecology 206:387–9.

Crenshaw J 2007. Care practice #6: No separation of mother and baby, with unlimited opportunities for breastfeeding. Journal of Perinatal Education 16:39–43.

Davidoff MJ, Dias T, Damus K, Russell R, Bettegowda VR, Dolan S et al. 2006. Changes in the gestational age distribution among US singleton births: impact on rates of late preterm birth, 1992 to 2002. Seminars in Perinatology 30:8–15.

Department of Health, Western Australia 2009. Baby-Friendly Health Initiative: hospital breastfeeding policy. Viewed 7 June 2013, <http://www.health.wa.gov.au/circularsnew/attachments/411.pdf>.

Dumas L, Lepage M, Bystrova K, Matthiesen A, Welles-Nyström B & Widström A 2013. Influence of skin-to-skin contact and rooming-in on early mother–infant interaction: a randomized controlled trial. Clinical Nursing Research. DOI: 10.1177/1054773812468316.

Elander G & Lindberg T 1984. Short mother–infant separation during first week of life influences the duration of breastfeeding. Acta Paediatrica Scandinavica 73:237–40.

Enkin M, Keirse MJNC. Neilson J, Crowther C, Duley L, Hodnett E et al. 2000. A guide to effective care in pregnancy and childbirth, 3rd ed. New York: Oxford University Press.

Erlandsson K & Fagerberg I 2005. Mothers' lived experiences of co-care and part-care after birth, and their strong desire to be close to their baby. Midwifery 21:131–8.

Flacking R, Lehtonen L, Thomson G, Axelin A, Ahlqvist S, Moran VH et al. 2012. Closeness and separation in neonatal intensive care. Acta Paediatrica 101:1032–7.

Green JM, Renfrew MJ & Curtis PA 2000. Continuity of carer: what matters to women? A review of the evidence. Midwifery 16:186–96.

Gurol-Urganci I, Cromwell DA, Edozien LC, Onwere C, Mahmood TA & van der Meulen JH 2011. The timing of elective caesarean delivery between 2000 and 2009 in England. BMC Pregnancy and Childbirth 11:43.

Hague WM, North RA, Gallus AS, Walters BN, Orlikowski C, Burrows RF et al. 2001. Anticoagulation in pregnancy and the puerperium. Medical Journal of Australia 175(5):258–63.

Hansen AK, Wisborg K, Uldbjerg N & Hansen TB 2008. Risk of respiratory morbidity in term infants delivered by elective caesarean section: cohort study. British Medical Journal 336:85–7.

Hatem M, Sandall J, Devane D, Soltani H & Gates S 2008. Midwife-led versus other models of care for childbearing women. Cochrane Database of Systematic Reviews Issue 4. Art. no.: CD004667.

Healthcare Commission 2007. Women's experiences of maternity care in the NHS in England: key findings from a survey of NHS trusts carried out in 2007. London: Commission for Healthcare Audit and Inspection.

Hibbard JU, Wilkins I, Sun L, Gregory K, Haberman S, Hoffman M et al. 2010. Respiratory morbidity in late preterm births. Journal of the American Medical Association 304:419–25.

Hodnett ED, Gates S, Hofmeyr GJ & Sakala C 2012. Continuous support for women during childbirth. Cochrane Database of Systematic Reviews, Issue 10. Art. no. CD003766.

Kamath BD, Marcotte MP & DeFranco EA 2011. Neonatal morbidity after documented fetal lung maturity in late preterm and early term infants. American Journal of Obstetrics and Gynecology 204:518.e1–8.

Kennell J, Klaus M, McGrath S, Robertson S & Hinkley C 1991. Continuous emotional support during labor in a US hospital. A randomized controlled trial. Journal of the American Medical Association 265:2197–201.

KEMH (King Edward Memorial Hospital) 2001. Inquiry into obstetric and gynaecological services at King Edward Memorial Hospital 1990–2000. Final report November 2001. Government of Western Australia, Department of Health.

KEMH 2010. Thromboprophylaxis after caesarean birth. Section B clinical guidelines. Viewed 28 March 2013, <http://www.kemh.health.wa.gov.au/development/manuals/O&G_guidelines/sectionb/7/b7.10.pdf>.

KEMH 2012. Breastfeeding: skin to skin contact. Section B obstetrics and midwifery care. Viewed 28 March 2013, <http://www.kemh.health.wa.gov.au/development/manuals/O&G_guidelines/sectionb/8/b8.1.4.pdf>.

Klaus MH, Jerauld R, Kreger NC, McAlpine W, Steffa M & Kennel JH 1972. Maternal attachment: importance of the first postpartum days. New England Journal of Medicine 286(9):460–3.

Li Z, Hilder L & Sullivan EA 2012. Australia's mothers and babies 2010. Perinatal statistics series no. 27. Cat. no. PER 57. Canberra: AIHW.

London's Maternity Services Commissioning Improvement Project (no date). Achieving 1:1 midwifery care in established labour: definition & guidance notes. Viewed 18 March 2013, <http://www.londonhp.nhs.uk/wp-content/uploads/2011/03/Maternity-commissioning-One-to-one-midwife-care-guidance-notes.pdf>.

Madar J, Richmond S & Hey E 1999. Surfactant-deficient respiratory distress after elective delivery at 'term'. Acta Paediatrica 88:1244–8.

Main E, Oshiro B, Chagolla B, Bingham D, Dang-Kilduff L & Kowalewski L 2010. Elimination of non-medically indicated (elective) deliveries before 39 weeks gestational age. San Francisco: March of Dimes.

McLachlan HL, Forster DA, Davey MA, Farrell T, Gold L, Biro MA et al. 2012. Effects of continuity of care by a primary midwife (caseload midwifery) on caesarean section rates in women of low obstetric risk: the COSMOS randomised controlled trial. British Journal of Obstetrics and Gynaecology 119:1483–92.

McLintock C, Brighton T, Chunilal S, Dekker G, McDonnell N, McRae S et al. 2012. Recommendations for the prevention of pregnancy-associated venous thromboembolism. Australian and New Zealand Journal of Obstetrics and Gynaecology 52:3–13.

Moore ER, Anderson GC, Bergman N & Dowswell T 2012. Early skin-to-skin contact for mothers and their healthy newborn infants. Cochrane Database of Systematic Reviews Issue 5 Art. no. CD003519.

Morgan BE, Horn AR & Bergman NJ 2011. Should neonates sleep alone? Biological Psychiatry 70:817–25.

Morris JM, Algert CS, Falster MO, Ford JB, Kinnear A, Nicholl MC & Roberts CL 2012. Trends in planned early birth: a population-based study. American Journal of Obstetrics and Gynecology 207:186.e1–8.

Morrison JJ, Rennie JM & Milton PJ 1995. Neonatal respiratory morbidity and mode of delivery at term: influence of timing of elective caesarean section. British Journal of Obstetrics and Gynaecology 102:101–6.

Murphy PA & Fullerton JT 2012. The Optimality Index—US, the Perinatal Background Index: Coding and scoring guidelines. Viewed 10 October 2014, <http://www.midwife.org/Codebook2011>.

NHMRC (National Health and Medical Research Council) 2009. Clinical practice guideline for the prevention of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients admitted to Australian hospitals. Melbourne: NHMRC.

NICE (National Institute for Health and Clinical Excellence) 2006. Clinical guideline 37. Routine postnatal care of women and their babies. London: NICE.

NICE 2011. Caesarean section. Viewed 3 June 2013, <http://www.nice.org.uk/nicemedia/live/13620/57163/57163.pdf>.

Nolan A & Lawrence C 2009. A pilot study of a nursing intervention protocol to minimize maternal–infant separation after caesarean birth. Journal of Obstetric, Gynecologic & Neonatal Nursing 38:430–42.

Norr KF, Roberts JE & Freese U 1989. Early postpartum rooming-in and maternal attachment behaviors in a group of medically indigent primiparas. Journal of Nurse-Midwifery 34(2):85–91.

NSW Health 2010. Maternity—towards normal birth in NSW. Sydney: NSW Department of Health.

NSW Health 2012. Midwifery continuity of carer model tool-kit. Sydney: NSW Ministry of Health.

Prodromidis M, Field T, Arendt R, Singer L, Yando R & Bendell D 1995. Mothers touching newborns: a comparison of rooming-in versus minimal contact. Birth 22(4):196–200.

Public Health Agency of Canada 2009. What mothers say: the Canadian maternity experiences survey. Ottawa: Public Health Agency of Canada.

Queensland Health 2012. Clinical services capability framework for public and licensed private health facilities v3.1. Module 26 maternity services. Brisbane: Queensland Government Department of Health.

Queensland Maternity and Neonatal Clinical Guidelines Program 2009. Venous thromboembolism (VTE) prophylaxis in pregnancy and the puerperium. Viewed 28 March 2013, <http://www.health.qld.gov.au/qcg/documents/g_vte5-1.pdf>.

Queensland Maternity and Neonatal Clinical Guidelines Program 2012. Normal birth. Viewed 7 June 2013, <http://www.health.qld.gov.au/qcg/documents/g_normbirth.pdf>.

RANZCOG (Royal Australian and New Zealand College of Obstetricians and Gynaecologists) 2011. Standards of maternity care in Australia and New Zealand. Melbourne: RANZCOG.

RANZCOG 2012. Timing of elective caesarean section at term. Viewed 3 June 2013, <http://www.ranzcog.edu.au/documents/doc_download/956-c-obs-23-timing-of-elective-caesarean-section-at-term.html>.

RCA, RCM, RCOG & RCPCH (Royal College of Anaesthetists, Royal College of Midwives, Royal College of Obstetricians and Gynaecologists, Royal College of Paediatrics and Child Health) 2007. Safer childbirth: minimum standards for the organisation and delivery of care in labour. London: Royal College of Obstetricians and Gynaecologists.

RCOG (Royal College of Obstetricians and Gynaecologists) 2008. Good practice no. 7. Maternity dashboard: clinical performance and governance score card. Viewed 18 March

2013, <http://www.rcog.org.uk/womens-health/clinical-guidance/maternity-dashboard-clinical-performance-and-governance-score-card>.

RCOG 2009. Reducing the risk of thrombosis and embolism during pregnancy and the puerperium. Green-top guideline no. 38a. Viewed 19 March 2013, <http://www.rcog.org.uk/files/rcog-corp/GTG37aReducingRiskThrombosis.pdf>.

Reddy UM, Bettegowda VR, Dias T, Yamada-Kushnir T, Ko CW & Willinger M 2011. Term pregnancy: a period of heterogeneous risk for infant mortality. Obstetrics and Gynecology 117:1279–87.

Royal Hospital for Women, NSW 2011. Thromboembolism prophylaxis and treatment. Clinical policies, procedures and guidelines manual. Viewed 28 March 2013, <http://www.seslhd.health.nsw.gov.au/rhw/Manuals/documents/Thromboprophylaxis/Thromboembolism%20Prophylaxis%20and%20Treatment.pdf>.

Royal Women's Hospital 2013a. Thromboprophylaxis: caesarean section. Policy, guideline and procedure manual. Viewed 28 March 2013, <https://www.thewomens.org.au/uploads/downloads/HealthProfessionals/PGP_PDFs/March_2013/Thromboprophylaxis_Caesarean_Section.pdf>.

Royal Women's Hospital 2013b. Breastfeeding the healthy term baby. Policy, guideline and procedure manual. Viewed 7 June 2013, <http://www.thewomens.org.au/uploads/downloads/HealthProfessionals/PGP_PDFs/May_2013/Breastfeeding_the_Healthy_Term_Baby.pdf>.

Sosa G, Crozier K & Robinson J 2012. What is meant by one-to-one support in labour: analysing the concept. Midwifery 28:451–7.

South Australian Perinatal Practice Guidelines Work Group 2012. Normal pregnancy, labour and puerperium management. Viewed 7 June 2013, <http://www.health.sa.gov.au/ppg/Default.aspx?tabid=54>.

Sullivan EA, Hall B & King JF 2008. Maternal deaths in Australia 2003–2005. Maternal deaths series no. 3. Cat. no. PER 42. Canberra: AIHW.

Tita ATN, Landon MB, Spong CY, Lai Y, Leveno KJ, Varner MW et al. 2009. Timing of elective repeat cesarean delivery at term and neonatal outcomes. New England Journal of Medicine 360:111–20.

Tita ATN, Lai Y, Landon MB, Spong CY, Leveno KJ, Varner MW et al. 2011. Timing of elective repeat cesarean delivery at term and maternal perioperative outcomes. Obstetrics and Gynecology 117:280–6.

Tooher R, Gates S, Dowswell T & Davis LJ 2010. Prophylaxis for venous thromboembolic disease in pregnancy and the early postnatal period. Cochrane Database of Systematic Reviews Issue 5 Art. no.: CD001689.

US Joint Commission 2012. Specifications manual for joint commission national quality core measures [Version 2012b]. (This manual is periodically updated). Viewed 11 June 2013, <https://manual.jointcommission.org/releases/TJC2012B/>.

WHA 2007. Supporting excellence in maternity care: the core maternity indicators project. Canberra: Women's Hospitals Australasia.

WHO/UNICEF (World Health Organization) 2009. Baby-friendly hospital initiative : revised, updated and expanded for integrated care. Section 4 Hospital self-appraisal and monitoring. Geneva: World Health Organization.

Widstrom AM, Wahlberg V, Matthiesen AS, Eneroth P, Uvnas-Moberg K & Werner S 1990. Short-term effects of early suckling and touch of the nipple on maternal behavior. Early Human Development 21(3):153–63.

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Related publications

Additional information and data on the National Core Maternity Indicators can be found at the AIHW's data portal at http://www.aihw.gov.au/ncmi/.

- AIHW 2014. Foundations for enhanced maternity data collection and reporting in Australia: National maternity data development project—Stage 1. Cat. no. PER 60. Canberra: AIHW.
- AIHW 2012. Maternal morbidity data in Australia: an assessment of the feasibility of standardised collection. Cat. no. PER 56. Canberra: AIHW.
- AIHW National Perinatal Epidemiology and Statistics Unit and AIHW 2013. National core maternity indicators. Cat. no. PER 58. Canberra: AIHW.
- Li Z, Zeki R, Hilder L & Sullivan EA 2013. Australia's mothers and babies 2011. Perinatal statistics series no. 28. Cat. no. PER 59. Canberra: AIHW.

This report on stage 2 of the national core maternity indicators project describes the development of 8 indicators, including scoping and assessment of existing data items for reporting. Of the 8 indicators proposed, 3 will be added to the existing set of 10 national core maternity indicators, 2 existing and 1 additional indicator will undergo further development and 3 will not undergo further development at this time.