CHAPTER 1

History taking and the newborn examination: an evolving perspective

Claire Evans

[1] *Warrington and Halton Hospitals NHS Foundation Trust, Warrington, Cheshire, UK*

[2] *Seconded post as Implementation Lead with the UK NSC NIPE Programme Centre, Public Health England, London, UK*

KEY POINTS

- The principal aim of history taking is to screen for predictive risk indicators that may predispose the newborn to an adverse postnatal transition or presence of an abnormality that requires an appropriate and timely referral for further diagnostics.
- The newborn examination history-taking process should be mapped to the UK NSC Antenatal and Newborn Screening Programme and be used as a benchmark for screening and assessment of risk factors in the neonatal period and beyond.
- Identification of risk factors within the newborn screen examination can isolate and target health promotion issues.

Introduction

A comprehensive history taking is implicit to all health-care disciplines to aid the diagnostic consultation process and to inform the optimal course of management. The skill of history taking has changed over the decades and has adopted a wider context as a predictive diagnostic tool. In order to facilitate a more holistic approach to the examination of the newborn, a thorough evaluation of the maternal and newborn history is essential. Short-term outcomes, long-term morbidities or even mortality can be influenced by the quality of the history taking in terms of the predictive risk for some adverse clinical conditions.

This chapter outlines the context of the history profile from the maternal, perinatal and familial perspectives. It also addresses history taking as a skill and the potential barriers that may reduce the effectiveness of the process. The aim

Examination of the Newborn: An Evidence-Based Guide, Second Edition. Edited by Anne Lomax.

Companion Website: www.wiley.com/go/lomax/newborn

of this chapter is not only to address common risk factors but also to embrace the wider context of history taking from a psychosocial and safeguarding perspective. The focus on history taking must be meaningful, achievable and valuable to the newborn examination practitioner. History taking remains the principal standard underpinning the clinical examination; disregarding the importance of history taking may lead to suboptimal practice and outcomes. Gathering a history effectively demands time and should not be rushed as it is a powerful instrument that can influence the quality of the examination.

Several national directives have raised the profile of the newborn physical examination. They stipulate the importance of a thorough and, to some degree, systematic history assessment (Skills for Health, 2004; NICE 2006a, 2006b; NHSQIS, 2004; UK NSC, 2008). In particular, the *UK NSC Newborn and Infant Physical Examination Standards and Competencies* (UK NSC, 2008) outlines a competency statement that addresses the history assessment. The NIPE Standards are currently under development for republication. Following the relaunch, the new standards will be available to view on the UK NSC NIPE Screening Programme website: http://newbornphysical.screening.nhs.uk/. However, for the purposes of this chapter, the NIPE Standards document will be a reference source until updated. This approach should encompass all relevant information from the maternal and newborn medical records, dialogue with the mother and/or father and information from clinical staff.

Objectives and characteristics of good history taking

The principal aim of the history-taking exercise is to find predictive risk indicators that may identify those newborns who are at risk of an adverse postnatal transition extending into childhood. Families with newborns who are identified as being at risk will then benefit from early detection, intervention and therapeutic options. To achieve this, the history profile must be factual, accurate, concise, informative and relevant. Discussions with the mother and father, to gather the history, can also offer a platform that targets health awareness and safety issues to promote optimal health in the neonatal period and beyond. A review of maternal and parental lifestyle habits in general, e.g. smoking, addictive behaviours and high-conflict relationships can be identified, and appropriate referrals or support can be arranged. Other health promotion issues include BCG vaccination to high-risk populations.

The quality of the history-taking process is largely dependent on the skill of the practitioner. Health-care professionals who conduct the newborn screen examination are fortunate in having pre-existing skills that are transferable. Doctors and midwives engage in history taking on a regular basis within their daily practice. However, the underlying principles of history taking follow that of all patient groups. Howard (2008) comments upon the role of history taking in

establishing trust which in turn paves the way for the physical examination. Thus, the interpersonal skills of the newborn examiner can influence the quality of the history obtained. Mannerisms, eye contact, body language, patience, listening skills and empathy are all key skills that any health-care professional requires to obtain a good history. If there is any deficiency in these key skills, the level of narrative imparted by the mother or father to the health professional may be negatively affected. Stoeckle and Billings (1987), in their signature work on history taking, refer to the process as a clinical interview and the manner in which it is conducted will influence the communicative processes necessary to generate the clinical picture.

Parallels can be drawn between history taking for the newborn examination and maternal history taking throughout pregnancy (NHS QIS, 2004), which may illuminate any element of risk to the mother/infant dyad. In addition, engagement of mothers and fathers with the history-taking exercise facilitates participation in the decision-making process and the request for consent (NHS QIS, 2008). These aspects of history taking are just as relevant to the newborn.

It is important to note that in the event of any subsequent admission to hospital for the infant, the first point of reference is the history and newborn physical examination. In addition, should anything have been missed during the examination, e.g. cleft palate, a dislocated hip, then this may result in a complaint and possible litigation (see also Chapter 9). A thorough history can identify potential as well as actual risk of an aspect being overlooked, which may later impact upon neonatal and infant outcome.

Concise and thorough history taking will also assist the health-care professional to ascertain whether or not the criteria are met for the examination of a healthy newborn. Some aspects of the history may require midwives or neonatal nurses to refer the newborn to a medical colleague as a more detailed examination may be necessary. For this reason, it is vital that maternity units have local guidelines in place to support all health-care disciplines who undertake the newborn examination.

Paediatric medicine has long since considered family history as key to the clinical examination process. The family profile is informative when screening for common complex and single-gene conditions but includes isolating genetic predispositions in some families (Green, 2007). As a result, several family-history-taking checklists in the form of mnemonics have emerged to guide paediatricians. Such systems may be helpful and indeed insightful, but it cannot be fully applied to newborn history taking. However, it does highlight the importance of gathering information in an ordered manner, and, most importantly, that the family history must be placed at the centre of history taking for the newborn infant.

Building a history profile: where to start?

When building a history profile, there is a clear identifiable process to follow. Assimilation of the perinatal history can be challenging, and therefore, the first point of reference has to be the maternal medical records. However, knowing what to look for and having some order of assemblage in the gathering of information is crucial if the task is to be efficient and not time-consuming. The maternal booking history often yields the most significant information alongside the serology results. The maternal early booking history will, in the main, provide most of the baseline history. This should provide the medical and surgical history of the mother as well as the maternal well-being so far with the pregnancy. The maternal booking interview should be completed before the twelfth week of pregnancy as proposed by *Maternity Matters* (DH, 2007), the policy document on maternity care, and endorsed by the UK National Screening Committee (NSC, 2007). Early booking will maximise a woman's exposure to, and choice of, the screening programmes available, thus identifying those women and families who need interventional support with lifestyle choices.

Reliance upon the maternal medical records alone will not provide all the information needed. It is, therefore, necessary to question the mother and/or father on family history in order to extract the risk factors that parallel the national standards (UK NSC, 2008). The core elements of the national standards for the newborn screen examination have provided a structure for risk assessment through history taking.

The UK NSC Antenatal and Newborn Screening Programme should be used as the benchmark screening tool for the newborn screen examination (see Table 1.1). The maternal antenatal screen will provide a framework of investigative results for the examiner that will provide the foundation for the history profile. The *Newborn and Physical Examination Standards and Competencies* document (UK NSC, 2008) found at: http://newbornphysical.screening.nhs.uk/ provides a structure within competency statement 1, which outlines the aspects to be considered when assimilating the history profile. Table 1.2 outlines the content of Competency 1 and can be used as a point of reference.

Evaluation of maternal medical records: biophysical information

The maternal socio-demographic and biophysical details should be assessed. Age must be noted, particularly in the teenage primigravida, as additional health promotion and education by the examiner may be necessary upon completion of the examination. Early and recent evidence suggests that upper and lower margins of maternal age are adversely related to prenatal and perinatal outcome (Haines et al., 1991; Viegas et al., 1994; Battin and Sadler, 2010). However,

Table 1.1 Key elements of the National Antenatal and Newborn Screening Programme.

	Timing	Biophysical details
Serology investigations		
Blood profile to include group, rhesus and antibodies status and haemoglobin	At booking Antibodies and haemoglobin repeated at 28 weeks	Approximately 15% of the population are rhesus-negative (Salem and Singer, 2009). Anti-D immunoglobulin is offered to all rhesus-negative women at 28 weeks' gestation to prevent haemolytic disease in the newborn. Maternal antibodies can also cause haemolytic disease.
Sickle cell	As early as possible preferably by 10 weeks' gestation	Inherited genetic condition resulting in the red blood cell forming a sickle cell shape. There are variants of this disease which impacts on the severity. In cases where women are healthy carriers, the baby's father should be offered screening. The risk of an affected infant is 1:2 where both parents are carriers (NHS ANSP, 2008).
Thalassaemia	As early as possible preferably by 10 weeks' gestation	Inherited genetic condition which affects the production of red blood cells. The genes that make haemoglobin are altered causing anaemia. This condition takes two forms: alpha and beta (Ryan et al., 2010).
Hepatitis B	At booking	Some populations of women are at high risk of Hepatitis B infection (HBsAG positive). Transmission of the virus is through sexual contact, vertical transmission or contaminated blood, e.g. needle sharing. Transmission to the fetus can be transplacental. Vaccination of the newborn must be offered to HBsAG positive women and their partners (DH, 2003).
HIV	At booking	HIV infection is a retrovirus that causes an alteration of the immune system. The virus infects the CD4 cells or the helper T cells which lower the body's cell-mediated immunity. Infection with HIV-1 can progress to AIDS (Carpenter et al., 2009).
Syphilis	At booking	Sexually transmitted disease with a risk of transplacental transmission.

(*continued overleaf*)

Table 1.1 (*Continued*).

	Timing	Biophysical details
Rubella	At booking	Viral infection with risk transplacental transmission.
First trimester combined test	11 + 2 – 14 + 1	Combined screening test with combination of age, blood profile, nuchal scan measurement and other factors.
Ultrasonography		
Nuchal translucency	11–14 weeks (Part of combined test)	Nuchal translucency measurement greater than 3.5 mm in early pregnancy. This finding is significant as associated with cardiac and syndromic pathology. This finding is also part of the 'combined' screening test for trisomy 21.
Quadruple test	14 + 2 – 20 + 0 weeks	Biochemistry tests, which include AFP, BHcG, oestriols and inhibin A.
Fetal anomaly	18 – 20 + 6 weeks	This scan can detect certain gross structural anomalies but does have its limitations. Approximately 45% of cardiac defects can be detected at this particular time.
Newborn and Infant Physical Examination (NIPE) National Standards	Within first 72 hours of birth Repeated at 6–8 weeks of age	Full physical and behavioural examination of the newborn incorporating the four core condition-related screening standards – developmental dysplasia of the hip, examination of the eye, congenital heart defects and undescended testes.

Data sources: NSC (2007, 2008); NHS, Greater Manchester Public Health Network (2009).

Table 1.2 How Competency 1 of the *Newborn Physical Examination Standards and Competencies* (UK NSC, 2008) can be used to create a history profile.

Creating a history profile					
Maternal biophysical data	**Antenatal screening results**	**Pregnancy and labour history**	**Family history**	**Psychosocial factors**	**Newborn**
Health status Cardiac disease Renal disease Hypothyroidism Depression Nutritional status and BMI	Serology reports Rhesus status Ultrasound scan profile Diagnostic investigations	Incidence of infection and bacteria isolate Pathologies Pre-eclampsia Placental insufficiency, etc. Mode of delivery and presentation Pre-labour length of membranes rupture	History of diabetes Intergenerational Conditions Inborn errors of metabolism First-degree relative with CHD First-degree relative with DDH	Smoking Substance use Alcohol dependency Depression High-conflict Relationship Safeguarding issues with siblings Social services involvement with family	Resuscitation at birth and response Mode of feeding Passage of urine and meconium General health since birth Parental concerns Symptomatic of illness

Bornstein et al. (2006) explore this relationship, concluding that varied age groups have differing parenting abilities. Nevertheless, the teenage mothers may require more intensive health promotion advice for themselves, possibly their partners and their newborn infants.

There is a new general health agenda emerging within society in relation to lifestyle and in particular to maternal diet and weight profile. A raised body mass index (BMI) can influence general health and may also indicate the family unit's dietary habits. A positive relationship exists between a raised BMI and complications of pregnancy including diabetes, hypertensive disease and thromboembolic disorders (Bhattacharya et al., 2007; CEMD, 2002; CMACE/RCOG, 2010). Pregnancy outcome can be affected, resulting in macrosomia, shoulder dystocia at delivery and hypoglycaemia of the newborn (Sebire et al., 2001; Kalk et al., 2009; Khashan and Kenny, 2009). Maternity units must have a policy in place for the prevention, detection and treatment of neonatal hypoglycaemia to identify those newborns most at risk.

Previous obstetric histories can provide information regarding maternal well-being and pregnancy outcome, which may be of relevance. Particular notice should be taken of the health of existing siblings. Where there has been a previous sudden infant death syndrome (SIDS) sibling, this must be noted. It is good practice to offer the option of an ECG being performed on the new sibling to rule out any risk of cardiac conduction disorders, e.g. prolonged QT syndrome or Wolff–Parkinson–White syndrome. The newborn would also be on the Care of the Next Infant scheme with the provision of an apnoea monitor prior to discharge.

The medical history can reveal conditions such as maternal hypothyroidism, cardiac disease, blood disorders, e.g. idiopathic thrombocytopenia, haemophilia Von Willebrand disease or maternal depression. The surgical history may not have such a direct impact upon risk for the newborn but does add to the completeness of the history-taking process for the health-care professional.

The intrapartum history is important in terms of identifying risk factors for the newborn. Taking note of the mode of delivery is important as this in itself may impact upon the health of the newborn. If shoulder dystocia presented during the second stage, the infant must be thoroughly examined by a senior paediatrician for evidence of an Erb's palsy, a clavicle fracture or sternomastoid muscle damage. An examination in the immediate post-delivery period by a paediatrician should be part of the maternity service local shoulder dystocia management guideline.

Breech presentation carries a strong correlative risk of Developmental Dysplasia of the Hip and is, therefore, a nationally recognised risk factor. Breech presentation at birth irrespective of mode of delivery or clinically diagnosed in pregnancy after 36 weeks' gestation or if external cephalic version performed for breech presentation irrespective of gestational age at delivery requires referral of the newborn in line with the national NIPE Standards (UK NSC, 2008).

Table 1.3 Maternal medical records: summarised alert indicators.

Maternal medical records: alert indicators
Ultrasound scans:
• Polyhydramnios
• Oligohydramnios
• Dilated renal pelves
• Intrauterine growth restriction
• Suspected chromosomal or syndromic aberrations
• Other significant ultrasound screening findings
• Congenital heart defect
Abnormal combined or quadruple test result
HIV positive serology status
Hepatitis B and C
Haemoglobinopathy
Maternal antibodies
Maternal pyrexia in labour
Prolonged fetal tachycardia
Pre-labour prolonged rupture of membranes
Meconium-stained liquor
Maternal Group B streptococcal infection
Breech presentation
Maternal disease state: type 1 and type 2 diabetes, autoimmune disorders, e.g. systemic lupus erythematosus
Maternal substance use
Maternal alcohol dependency
Thrombocytopenia

A precipitate delivery may cause facial congestion, which can be misdiagnosed as cyanosis. An instrumental delivery may result in the newborn suffering a degree of head trauma, such as bruising, which may require analgesia and can increase the risk of hyperbilirubinaemia (see Table 1.3 and also Chapter 3).

Meconium-stained liquor (MSL) can be problematic for a minority of newborns and, therefore, must be noted from the delivery summary. The presence of MSL is associated with an increased mortality and morbidity, accounting for 2% of perinatal deaths (NICE, 2007). It is relatively common with an occurrence of 15–20% in term pregnancies (NICE, 2007). Although meconium aspiration syndrome is relatively rare, some of these infants may seem well at delivery but rapidly develop signs of respiratory compromise as a result of aspiration. NICE (2007) advocate close observation of the newborn with MSL present at delivery in the immediate postnatal period.

Newborn examiners must be continuously on the alert for possible risk factors for early-onset neonatal sepsis. Early-onset sepsis in the newborn is a significant contributor to mortality statistics. One of the most common bacterial isolates is group B haemolytic streptococcus (GBS) that carries a mortality of 6% in term infants and 18% in preterm infants (NICE, 2007). Maternal infection during the

antenatal period must be actively treated with antibiotic therapy. Treatment with antibiotics for the newborn may also be required but is risk dependent or if the newborn is symptomatic. Ohlsson and Shah (2009) inferred that intrapartum antibiotic therapy does reduce the risk of early-onset GBS in the newborn. Ungerer et al. (2004) reported mortality as high as 50% in untreated infants.

In the case of pre-labour prolonged rupture of membranes, the length of time must be noted (NICE, 2012). The risk of early-onset GBS infection in the newborn is greater in women with PROM (RCOG, 2003; NICE, 2007). In the absence of any other symptoms, true maternal pyrexia in labour must never be ignored. In addition, there was no strong evidence to recommend antibiotic prophylaxis for newborns of women with PROM in labour (NICE, 2012).

Conversely, the symptomatic newborn must commence antibiotic therapy and admission to the neonatal unit for further diagnostics. Every newborn must be treated on an individual basis, depending on the risk factors presenting. Multiple risk factors will necessitate newborn screening for infection and the commencement of antibiotic prophylaxis until blood culture results become available. Local policy on the prevention and detection of early-onset sepsis in the newborn must reflect the red flag and non-red flag risk indicators as detailed in the NICE guidance for antibiotics for early-onset neonatal infection (NICE, 2012) available at http://www.nice.org.uk/guidance/CG149/resources. The NICE guidance advocates the avoidance of routine antibiotic therapy. It is estimated that 90% of newborns with early-onset sepsis will be symptomatic within 12 hours of birth (NICE, 2007). Therefore, all newborns with risk factors for early-onset infection must receive close observation and documentation of an observations regime. The newborn examiner must ensure that the observations are documented and reviewed within the context of the examination and assessment of the overall health of the newborn.

The newborn of the diabetic mother, irrespective of diabetes type, will require blood glucose monitoring. The newborn examiner must review the blood glucose results prior to conducting the examination. Local policy will dictate the monitoring intervals for such newborns. Suboptimal results will require more active management of hypoglycaemia that may necessitate admission to the neonatal unit.

The UK NSC Antenatal Screening Programme

The UK NSC Antenatal Screening Programme components (Table 1.1) aim at helping the examiner through the investigations and results and signpost the relevant information within the maternal medical records. Familiarisation with the key components of the programme will enhance this process.

The maternal prenatal serology results must be evaluated, particularly the rhesus status. A maternal rhesus-negative status or the presence of antibodies

should alert the examiner to the possibility of rhesus incompatibility and the risk of early-onset pathological hyperbilirubinaemia with the first 24 hours of life. A sibling of the newborn with neonatal jaundice requiring phototherapy carries a significant risk (NICE, 2010). Further information on neonatal jaundice management guidelines can be found on the NICE website: http://www.nice.org.uk/guidance/CG98. Surveillance of the newborn should be increased, particularly in the case of an early discharge to the community. The maternal rubella status should be noted as postnatal maternal vaccination may be required.

The human immunodeficiency virus (HIV), hepatitis B and hepatitis C status should be reviewed in all cases. However, such infections may be more likely alongside evidence of maternal substance misuse.

A family history of metabolic disease must also be noted particularly following the incident alert with medium-chain acyl-coenzyme A dehydrogenase deficiency (MCADD) (NPSA, 2011). If MCADD is known within the family, then the newborn will require early special rapid bloodspot testing at 24–48 hours of age prior to the standard bloodspot screen in 5–7 days. Further information on bloodspot screening can be obtained from the UK NSC Bloodspot website: http://newbornbloodspot.screening.nhs.uk/ and the British Inherited Metabolic Disease Group at: http://www.bimdg.org.uk/site/index.asp.

Fetus in focus

Ultrasonography in pregnancy is part of the UK NSC Fetal Anomaly Screening Programme (FASP) where two key ultrasound scans are offered as a minimum standard (UK NSC FASP 2010). The first scan is the early dating scan. It is, therefore, important to note the gestational age of the newborn from the earliest ultrasound scan result prior to conducting the examination.

The second is the 18–20-week fetal anomaly scan. Additional serial scans will be performed if and when an abnormality is detected, either with the fetus or with the intrauterine environment, e.g. liquor volume or placental positioning. Fetal growth estimation is the primary parameter assessed. Evidence of intrauterine growth restriction is not an uncommon finding at this stage. There may be evidence in the maternal history that may indicate why the infant is small for gestation age. There may be a pre-existing maternal medical condition that has adversely contributed to placental function resulting in a poor fetal growth profile. Fetal growth restriction may be a feature of an underlying chromosomal abnormality or some other pathology, e.g. transplacental viral transmission or the effect of a toxic substance, e.g. alcohol excess in pregnancy. Further information on the UK NSC FASP Programme can be obtained from the website: http://fetalanomaly.screening.nhs.uk/.

The UK NSC FASP (2010) has set a benchmark for the condition that should be screened for during this particular anomaly scan. Whilst it is useful in many cases, it is prudent to accept that this scan does have its limitations; therefore, the focus lies with a standard for 11 structural conditions where the specificity

for detection is greater than 50% (UK NSC FASP, 2010). Conditions screened for are given as follows:

- Anencephaly
- Open spina bifida
- Cleft lip
- Diaphragmatic hernia
- Gastroschisis
- Exomphalos
- Serious cardiac anomalies
- Bilateral renal agenesis
- Lethal skeletal dysplasia
- Edward's syndrome (trisomy 18)
- Patau's syndrome (trisomy 13)

Adapted from the UK NSC Fetal Anomaly Screening Programme

The presence of other findings is significant and, as such, is reportable by the ultrasonographer as listed subsequently.

- Nuchal fold (>6 mm)
- Ventriculomegaly (atrium >10 mm)
- Echogenic bowel (with density equivalent to bone)
- Renal pelvic dilatation (AP measurement >7 mm)

Fetal renal pelvic dilatation will require serial scan monitoring throughout the pregnancy. However, it is particularly important to note this during history taking and to arrange follow-up ultrasound scans and urology clinic referral for the newborn.

The presence of oligohydramnios must alert the examiner to the possibility of the following:

- Prolonged rupture of membranes earlier in the pregnancy
- Urinary tract anomaly or uropathy
- Fetal growth restriction (Baxter et al., 2010)
- Intrauterine infection

Conversely, polyhydramnios will alert the examiner to consider the following:

- Duodenal atresia or stenosis (Rajiah, 2009)
- Oesophageal atresia

(See also Chapter 5)

Exposure to the effects of intrauterine teratogens has been investigated and publicised over recent decades, but arguably the most common causes of such exposure are smoking and excessive alcohol consumption during pregnancy. Smoking is the most common substance dependency, yet the most preventable. Reduction in maternal smoking during pregnancy remains high on the public health agenda through smoking cessation initiatives as part of maternity care (NICE, 2010). Clinical guidance can be found on the NICE website:

http://www.nice.org.uk/nicemedia/live/13023/49346/49346.pdf. There is compelling evidence highlighting the adverse effects of maternal smoking in both the antenatal and postnatal periods (La Souef, 2000; Gilliland et al., 2001; Landau, 2001; Stocks and Dezateux, 2003; British Medical Association, 2004; Bradley et al., 2005). The adverse health implications for the newborn and older children are numerous and can impact on mortality and morbidity.

Perhaps the most significant, devastating and indeed most publicised adverse effect of parental smoking is the increased risk of SIDS (McMartin et al., 2002; Anderson et al., 2005; Matturi et al., 2006; Sellwood and Huertas-Ceballos, 2008). The hypothesis surrounding this causal relationship is multifactorial ranging from respiratory infection susceptibility to altered respiratory control mechanisms (Hofhuis et al., 2003). This positive association cannot be underestimated nor ignored; therefore, the prevention of SIDS is high on the maternity services' health education agenda for the newborn examination.

Smoking cessation merits a much higher profile during the antenatal and immediate postnatal period and must be addressed thoroughly at the time of the newborn examination.

Fetal alcohol exposure from excessive maternal consumption is associated with dysmorphic features and varied neurodevelopmental and behavioural disorders ranging from fetal alcohol syndrome to fetal alcohol spectrum disorders (Disney et al., 2008). Maternal alcohol consumption is often associated with an existing suboptimal social environment (Dawson, 2003). The newborn can also suffer withdrawal symptoms from prenatal alcohol exposure, which may result in seizure activity (Lall, 2008).

Admittance to alcohol consumption during pregnancy in excessive amounts is often retrospective (Jacobson et al., 2002); therefore, intervention and preventative strategies must be put in place for subsequent pregnancies. Disney et al. (2008) reports on the long-standing evidence (Olson et al., 1997; Roebuck et al., 1999) to support altered neurobehavioural abilities in infancy through to antisocial behaviour and attention deficit disorders in children from small amounts of alcohol during pregnancy (Jacobson et al., 2002; Sayal, 2007; Sayal et al., 2009). Enquiries into maternal alcohol and units consumed are made by midwives at the prenatal booking interview. For some newborns, the cessation of alcohol use, even early in the first trimester, may be too late.

Maternal substance-misuse signals a probable newborn withdrawal process and a challenge to the health-care team in establishing the exact nature of the drugs taken. In the first instance, the newborn examiner must establish what illicit drugs have been taken in pregnancy and the immediate pre-labour period. However, obtaining an accurate substance use history is often fraught with imprecise maternal disclosures. Such behaviour can be linked to the social stigmatisation of drug misuse and the fear of the newborn being placed in foster care. Sensitive, but direct, further maternal questioning may be required, especially in cases of polysubstance use.

The withdrawal timelines for the common illicit substances have been well documented over recent years. Withdrawal from opiates and heroin can be evident in the newborn within hours of birth, whilst the effects of exposure to cocaine and amphetamine begins within 48 hours of birth (Wang 2010) (Wang, 2010) and withdrawal from methadone does not occur until 48–72 hours of age (Leggate, 2008) but it can be as long as 7–14 days before withdrawal is evident (Lall, 2008; Wang, 2010). The longer half-life of methadone is known to prolong and increase the severity of the withdrawal symptoms. Neonatal abstinence syndrome (NAS) is often considered the foremost adverse condition for the newborn of the substance-misuse mother; however, the effects upon fetal brain development have far more significant and long-lasting consequences. Substance use in the first 20 weeks of pregnancy can cause disruption in the cytogenesis and cell migration processes. In the subsequent weeks of pregnancy, cell differentiation and overall brain growth can be disturbed (Wang, 2010), including midline defects and congenital heart defects (Mone et al., 2004).

NAS indicates multisystem involvement, resulting in a cascade of symptoms. Fetal growth is disrupted, resulting in growth restriction which can independently place the newborn at greater risk of co-morbidity (Smith et al., 2006). Normal neurobehavioural function is altered resulting in a display of central nervous system instability, abnormal feeding behaviour, respiratory compromise and gastrointestinal symptoms (Volpi-Wise, 2005; Hamden, 2009). Seizure activity can manifest as a late-onset symptom of diazepine withdrawal.

NAS can occur with prescribed maternal medication. Morphine-based analgesia for long-term protracted pain management and psychotropic drugs for mental illness are the most common. The social context of the mother requiring morphine for long-term pain in many cases differs from that of the illicit substance user. Nonetheless, a sensitive approach is required with these parents when reiterating information about the clinical presentation of NAS, as they will have already received information in the prenatal period.

Where maternal substance use is known, it may be prudent for midwives and neonatal nurses to refer the examination to a senior paediatrician as the newborn will require a more thorough examination to assess for withdrawal symptoms.

Risk factors and the newborn examination

Intergenerational traits may indicate an inheritance risk to the newborn. History taking may elicit such conditions (see Chapter 7). However, they may have already been identified in prenatal period, particularly the haemoglobinopathies, e.g. thalassaemia or sickle cell disease. The UK NSC Antenatal Screening Programme performs well in such cases. Additional risk factors can be isolated through application of the *NIPE Standards and Competencies* (NSC, 2008). Table 1.4 presents the four screening components from the NIPE Standards document and

demonstrates conditions that carry a predictive risk, as well as other conditions that may have a positive family trait.

It can be argued that some elements of the newborn screening agenda perform poorly in terms of predictive risk based on clinical examination alone. The newborn screen examination does have its limitations. The most common example is current screening techniques for congenital heart defects (CHD) (see also Chapter 2). It is estimated that 50% of CHDs are not detected in the newborn period (Wren et al., 2007; Sharland, 2010). Despite prenatal cardiac screening as part of the fetal anomaly scan and the clinical cardiovascular assessment at the newborn screen examination, current methods of detection do not compete on merit as an effective screening tool. This is particularly the case for critical duct-dependent anomalies (Abu-Harb et al., 1994; Green and Oddie, 2008; Ewer et al., 2012). Sharland (2010) confers that the majority of congenital cardiac anomalies lie within low-risk factions. However, a positive family history does correlate with a higher incidence (Romano-Zelekha et al., 2001).

The use of pulse oximetry as an additonal tool in the newborn and screening examination may improve the detection rate of critical CHD for some newborns. There is compelling and increasing evidence to support the use of pulse oximetry as an adjunct to the newborn examination (Knowles et al., 2005; Thangaratinam et al., 2012; Valmari, 2007; Ewer et al., 2012), thereby increasing the sensitivity of this screening tool overall.

Increased risk of cardiac anomalies related to newborn

- *Sibling*: Recurrence of 2–3% in a subsequent sibling increasing to a 50% recurrence rate in three affected siblings.
- *Parental cardiac anomaly*: 2–5% risk to infant.
- *Maternal diabetes*: 2% risk to infant particularly in uncontrolled diabetes.
- *Drug related teratogens*: For example, phenytoin, 2% risk to infant (adapted from Sharland, 2010).
- *Intrinsic fetal anomalies*: Incidence increased in the presence of other fetal structural or chromosomal anomalies, e.g. the triad of trisomies 21, 18 and 13.
- *Transplacental viral transmission*: Increased risk of CHD.
- *Parental consanguinity*: Increased risk of CHD (Ramegowda and Ramachandra, 2006; Khalid et al., 2006).
- Psychotropic drugs: Teratogenic and newborn effects, e.g. paroxetine may increase the risk of ventricular septal defect, lithium may increase the risk of Ebstein's anomaly.

Other common traits within families are atopy and asthma (Moore et al., 2004; Wadonda-Kabondo et al., 2004). These conditions can be of concern to parents and are often raised at the time of the newborn examination. Devereux et al. (2002) reported that maternal environmental factors could influence the fetal immune system and thus neonatal immunity resulting in an increased risk

Table 1.4 Predictive risk factors with potential impact upon newborn outcome.

The four NIPE Screening elements and others	Risk factors	Specific condition	Intergenerational trait status
Examination of the hips	First-degree relative with DDH Risk factors: persistent breech presentation or breech delivery Local policy risk factors, e.g. oligohydramnios, severe talipes, multiple birth	Developmental dysplasia of the hips	Positive
Examination of the eyes	First-degree relative with congenital eye condition	Congenital cataracts if associated with syndromes Glaucoma retinoblastoma	Positive
Examination of the heart	First-degree relative with CHD Major CHD on fetal anomaly scan Previous SIDS	Congenital heart defect Cardiac conduction mechanism disorders, e.g. prolonged QT syndrome, Wolf–Parkinson–White syndrome	Positive (dependent on cause)
Examination of the testes	Isolated finding	Unilateral or bilateral undescended testes – bilateral very significant	Positive
Significant others	Siblings First-degree relative Intergenerational	Chromosomal aberrations Genetic disorders Structural anomalies Syndromes Inborn errors of metabolism	Positive
	First-degree relative	Severe congenital hearing deficit	Positive
	First-degree relative (sibling)	Jaundice treated with phototherapy	Positive
	First-degree relative	Atopy: Dermatitis Eczema Epidermolysis bullosa	Positive
	First-degree relative	Asthma	Positive (multi-factorial variables – genetic, environmental)
	Intergenerational	Haemoglobinopathies, e.g. thalassaemia, sickle cell disease	Positive
	First-degree relative	Tongue tie	Positive
	Intergenerational	Marfan syndrome	Positive
	Intergenerational/first-degree relative	Myasthenia gravis	Positive

of atopy and asthma. Similarly, Moore et al. (2004) cited ethnicity, gender, gestational age at birth and family history, particularly maternal, as factors influencing the development of atopic dermatitis within the first 6 months of life. Such findings can confirm the genetic disposition of these disorders.

The NIPE Screening Monitoring and Reporting Tool (SMART) IT system provides a field containing the seven national risk factors mapped to the UK NSC Antenatal and Newborn Screening Programme. The NIPE Standards stipulate that 'family history' should be confined to a first-degree relative (UK NSC, 2008). Additional local risk factors, e.g. BCG vaccination requirement, maternal GBS infection, sibling with jaundice at birth, can be added to the risk factor menu for each individual maternity unit (see Introduction). The system provides data collection for audit purposes and the provision of key performance indicator (KPI) data against the NIPE national standards screening elements for quality assurance purposes and local performance monitoring. Most importantly, the system provides a 'failsafe' process to ensure that mothers and fathers are offered the newborn screen examination to avoid reportable incidents of 'missed' examinations.

The safety net for additional screening remains with the examiner at the time of the newborn physical examination to determine any further element of risk with the clinical assessment.

The psychosocial and safeguarding agenda

Parental psychosocial influences and adverse lifestyle choices have consistently demonstrated an impact upon the outcome for newborn infants, throughout childhood and into adulthood in terms of psychopathology morbidity (Hien and Honeyman, 2000; Maughan et al., 2001; Dawson, 2003; Disney et al., 2008) and mortality in extreme cases (Victoria Climbié Inquiry (Lord Laming Chair, 2003)). There are extensive and varied socio-demographic variables incorporated, which indicate the complexity of the subject matter (see the website that accompanies this book for more information on safeguarding). Co-morbidities exist between smoking, alcohol and substance misuse, domestic violence, maternal depression and adverse social environments, which place the newborn at a greater risk of maladaptive behaviours in childhood and adulthood that can replicate that of the parents (Leonard et al., 2007). Therefore, the aim of social support and intervention strategies in the prenatal period and beyond is to break the cycle. Previous discussions in this chapter surrounding all forms of substance addiction leave the newborn examiner in no doubt as to why women with such addictions require targeting in the immediate postnatal period as much as the antenatal period. See Table 1.5 for a summary of fetal and newborn outcome adverse effects related to lifestyle.

Maternal depression will be of significant interest to the newborn examiner. The use of psychotropic drugs can have an effect upon the newborn in relation to withdrawal symptoms (NICE, 2007; Wang 2010). In comparison to withdrawal

Table 1.5 Summary of defined and national risk factors.

Antenatal and Newborn Screening Programme risk factors	Additional defined risk factors
First-degree relative with DDH or hip problem in infancy or childhood	Maternal GBS positive status in current pregnancy/risk of early-onset neonatal infection
Breech presentation at birth or after 36 weeks gestation	Meconium-stained liquor present in labour
First-degree relative with a congenital heart defect	Risk of haemolytic disease in the newborn
First-degree relative with a congenital eye condition	Sibling with neonatal jaundice requiring phototherapy
Major cardiac defect detected on ultrasound scan	Neonatal BCG vaccine required
Major abnormality detected on ultrasound scan	
Maternal Hepatitis B, HIV, syphilis or rubella infection	
Family history of metabolic disease particularly MCADD	

behaviours in the newborn from illicit substances, the effects from antidepressant medication, particularly the selective serotonin reuptake inhibitors (SSRIs), are perhaps better defined (Sanz et al., 2005; Wang, 2010). The NICE Antenatal and Postnatal Mental Health guideline quick reference guide (National Collaborating Centre for Maternal Health, 2007) provides a useful table which contains the pertinent drug therapy for each psychopathological condition. This is very helpful to the newborn examiner who is perhaps unsure of the significance of such drugs taken during pregnancy. In summary of this document, the following drugs do have a known teratogenic effect upon the embryo in the first trimester:

- *Lithium*: Increased risk of fetal cardiac anomalies including Ebstein's anomaly. High levels in breast milk.
- *Valproate*: Increased risk of neural tube defects, altered cognitive development in childhood.
- *Carbamazepine*: Increased risk of neural tube defects, major fetal malformations including gastrointestinal tract and cardiac anomalies.
- *SSRIs*:
  - *Paroxetine*: Fetal cardiac anomalies
  - *Fluoxetine*: Lowest known risk during pregnancy but high levels in breast milk
- *Benzodiazepines*: Cleft palate and other fetal anomalies, 'floppy baby' syndrome in the neonate.
- *Tricyclic antidepressants (TCAs)*: For example, amitriptyline has the lowest level of risk in pregnancy.

Adapted from NICE (2007).

Within the antidepressant medication range, the SSRIs demonstrate the lowest level of risk in terms of withdrawal in the newborn period (Wang, 2010). Nevertheless, paroxetine, which is an SSRI, does cause mild withdrawal symptoms, which include jitteriness and signs of respiratory distress (Sanz et al., 2005;

Murray et al., 2007). Sanz et al. (2005) reported a higher incidence of withdrawal from paroxetine compared to fluoxetine (Prozac). Paroxetine is also associated with a higher incidence of ventricular septal defects (Stiskal et al., 2001; Health Canada, 2005).

The newborn examiner must firstly establish when the mother commenced the medication, and, secondly, check if the mother is still taking medication. There is an associated risk to the mother if she has abruptly stopped taking the medication at any point without seeking medical advice. This is particularly relevant in the immediate postnatal period and may predispose her to active postnatal depression. If the mother is still taking medication, then the newborn must have a thorough neurological examination. There is some debate as to whether withdrawal from antidepressant medication in the newborn is more of a toxicity reaction (NICE, 2007; Wang, 2010) to the drug as opposed to active drug withdrawal, which would increase the severity and prolong the severity of the symptoms.

Maternity services may have local guidelines in place for postnatal observation on newborns of mothers who have been prescribed antidepressant medication in pregnancy particularly during the latter stages.

In summary, the newborn examiner has the opportunity to observe the behavioural interactions between a mother and her newborn at the time of the newborn examination. Any concerns about abnormal attachment behaviour must be relayed to the midwife caring for the mother and newborn, in the first instance. The level of concern may necessitate the activation of the 'Safeguarding' pathway.

Public policy, with reference to Safeguarding, has rapidly changed the landscape of history taking. Having been brought into sharp focus on a national scale over the last 20 years since the advent of the Cleveland Report (1988) and the Children's Act of 1989, this issue is high on the agenda within maternity and paediatric services (DH, 2004). Evaluation of the family psychosocial background is an important facet of the newborn examination as it is at any other time in childhood. It is the responsibility of the newborn examiner to raise any concerns that have not already been addressed with the Safeguarding named midwife. Once this process is activated, the safety of that newborn will become paramount.

Paternal information is often viewed as a lesser priority. However, the father's date of birth is an important demographic in tracing any previous safeguarding issues or domestic violence should concerns be raised. With the date of birth, the police protection services can investigate any previous convictions or concerns. With the movement of some population groups around the country and the fluidity of family units within society, male partners may move from one family unit to another and not disclose any information about previous relationships, e.g. SIDS, congenital anomalies or previous child deaths. It is also important to know the names and dates of birth of other siblings even when not biologically belonging to the mother of the new infant.

It is vital that all aspects of Safeguarding are considered and applied during the history-taking process for the newborn screen examination. All significant information must be made available and shared between health professionals including neonatal and paediatric community teams and other multidisciplinary organisations involved in the protection of children. Lack of communication has been cited as a common and sadly repetitive failing of the 'Safeguarding Children' systems (*The Victoria Climbié Inquiry Report*) (House of Commons Health Committee, 2003; CEMACH, 2008; Haringey Local Safeguarding Children Board, 2008; CQC, 2009; NPSA, 2009).

Parental dialogue and involvement with the newborn assessment process

Women and their partners may already have concerns about their newborn at the start of the examination. These concerns may have a physical or behavioural focus. The history-taking process must include discussion with the mother and father, if present, prior to commencing the examination and invited to share those concerns. Some of these concerns may be delayed until the examination is completed. The dialogue regarding family history or worries demonstrates a collaborative approach to the examination and many mothers and fathers welcome the opportunity to engage with this aspect of their newborn's care. The history-taking interview for some parents can be therapeutic as they have a staff member who is more than willing to listen.

History taking following the NIPE Standards (UK NSC, 2008) for the examination of the newborn can be used to gain more information from the mother and father if present as detailed in Table 1.6. If the mother or father was adopted, then gaining a thorough family history will be problematic; therefore, a sensitive approach will be required.

The involvement of mothers and fathers in such conversations will not only engage them with the examination but also engender an early sense of responsibility for their newborn. Blake (2008) advocates the empowerment of women to examine their newborns, thereby making an active contribution to the assessment of the neonate. This level of participation can enhance the women-centred care experience for many mothers as well as helping to lessen the incidence of abnormalities which are missed at the newborn screen examination. Many women and their partners examine their newborn in detail and can often be the authority on many aspects of their newborn's external appearance and behaviour.

The culture within maternity care services requires implementation of the concept by Blake (2008) from a health promotion perspective. In the first instance, a time line exists within those initial stages of newborn care and surveillance where mothers and fathers must assume responsibility for the

Table 1.6 Maternal/paternal lifestyle and psychosocial influences.

Lifestyle	Fetal effect	Potential neonatal and childhood outcome
Smoking	Spontaneous abortion Altered placental morphology Chronic hypoxia Intrauterine growth restriction (IUGR)	Abnormal newborn neurobehaviour Increased risk of infant irritability Hypertonia Childhood behavioural problems Lowered immunity SIDS, RSV infection Lower respiratory tract infections Altered pulmonary function Childhood asthma Increased risk of tobacco dependency in adulthood
Alcohol use	Fetal alcohol syndrome (FAS) IUGR	FAS Fetal alcohol disorder spectrum Behavioural problems
Substance misuse	Risk of transplacental transmission of Hepatitis B and C Congenital anomalies Symmetrical IUGR Prematurity Meconium liquor	Neonatal Abstinence syndrome
High-conflict relationships: domestic abuse	Intrauterine death Increased risk of acute obstetric complications which impact on newborn outcome	Child abuse Cognitive psychological impairment Childhood depression
Parent in care system		Increased risk of infant in care system Increased risk of child neglect

Data sources: Hien and Honeyman (2000), Maughan et al. (2001), Dawson et al. (2003), Disney et al. (2008).

welfare of their newborn. Therefore, they must be advised of the signs of illness and indicators for concern prior to discharge. This could have the following advantages:

- Possible earlier detection of CHD in the postnatal period.
- Probable earlier recognition of illness and a medical review by the general practitioner sought more promptly.
- Potential to prevent sudden infant death syndrome in infants with subtle symptoms of illness.

Currently, maternity services facilitate early and very early discharge options for mothers and newborns; therefore, parental awareness of the signs of illness and points of contact must be reprioritised within the health promotion agenda for the newborn screen examination.

Parental concern during the examination in relation to the cosmetic aspects of any minor findings and is often of great significance to them. The practitioner

Table 1.7 Common parental concerns at the newborn examination.

Syndactyly
Polydactyly
Feeding issues, e.g. vomiting
Mild talipes previously undiagnosed on ultrasound scan
Tongue tie
Skin tags
Sinuses
Birthmarks
Pseudo-menstruation
Moulding
Caput
Cephalhaematoma
Birth trauma markings
Intergenerational eczema, dermatitis and asthma
Intergeneration conditions and syndromes
Congenital abnormalities in first-degree relatives

must be able to recognise what is a minor variant in comparison to possible clinical dysmorphology. There are some physical findings, which may be a familial trait, e.g. syndactyly or polydactyly. See Table 1.7 for a list of common parental concerns found at the newborn screen examination. The practitioner must keep an open mind to the possibility of 'subtle' dysmorphic findings indicating a possible syndrome in the presence of other abnormal clinical features. There may be a contextual basis for this result, e.g. familial; therefore, examiners must assess the complete prenatal and postnatal history before seeking a senior paediatric option or expert review.

Interpretation of the information

Aside from the psychosocial skills of history taking, the ability of the examiner to interpret the information being given in a relevant way is just as significant. The history profile is only as good as the facts that are given and acknowledged as pertinent. The mother and father of the newborn may not recognise the significance of the questions being asked specific to family history. Some may be unaware of intergenerational traits within the family or of its significance to the newborn if there was. Romitti (2007) commented on the accuracy of reporting family history by relatives. Interestingly, some mothers did not always disclose that they had a previous child with a birth defect, and also the nature of the defect was not always accurately named. Socio-demographic variables did influence the accuracy of detail given. However, factual details from the family are often confounded by their own understanding of the condition and their description of the condition or defect when medical terminology is not used. Indeed, they may not

be clear on the exact position of the affected member in the family tree. It is not uncommon for a mother or father to contact other family members at the time of the newborn screen examination to obtain more information about conditions within the family.

As with many families who do have a positive trait for congenital anomalies or conditions, constructing the aetiology of the family from the environmental or genetic predisposition is often difficult. If a detailed family history is needed in the case of a positive intergenerational trait, then it may be desirable for the examination to be conducted by a senior paediatrician.

Importance of location for the newborn physical examination

The location of the examination is crucial to the quality of the history-taking discussion with the mother or both parents. The postnatal ward is not a benign environment as the majority are bustling and noisy and not conducive to a history interview. Women may not disclose sensitive information in this environment for fear of being overheard by other patients and health-care workers. Disclosure of domestic violence within the high-impact family relationship can be prohibited due to lack of privacy. Indeed, the presence of the father or other family members may also prevent disclosures of abuse. Patient confidentiality is paramount within the health service. Equally, noise is a distracting feature for both the examiner and the mother. The maternity services of the future may need to revise the existing provision for the examination of the newborn to accommodate an environment that provides privacy and quietness.

Electronic as well as written documentation should acknowledge and reflect that a detailed history has been taken. The use of a history sheet to record the pertinent history themes and significant risk factors can be used. The history sheet can then be placed in the newborn's medical records as evidence of the history-taking process.

Limitations to history taking

This chapter has addressed the elements of the history-taking assessment in order to inform the newborn screen examination. However, there are obstacles that may present and complicate the process. The two most common problems are time and the environment. These two elements alone can have a significant impact upon the quality and outcome of the history-taking exercise. The workload pressures endured by many newborn examiners impact upon the time available to perform the examination (Table 1.8).

Table 1.8 Limitations to effective history taking.

Time constraints in relation to excessive workload
Inappropriate questions
Questioning technique, e.g. manner
Misrepresentation of facts given about family history
Environment in which history is being obtained, e.g. noise
Confidentiality
Lack of privacy
Suppression of disclosure due to partner presence
Equality and diversity issues, e.g. language barriers, understanding, cultural diversity, disability, maternal deafness
Misinterpretation of information given

There are other barriers that can compromise the quality of history taking. The questioning technique, manner and general communication skills of the examiner can compromise the level of information imparted by the mother or both parents who may interpret the line of questioning as invasive, particularly at a sensitive time after childbirth. Conversely, they may have something to hide and fear probing questions. The language barrier has become an increasing problem for many minority groups. All maternity units have access to interpretation services and the 'Screening Tests for You and Your Baby' booklet is available in a variety of languages. Mothers with hearing disabilities must also be accommodated with a sign language representative.

The evidence base to support the varied facets of the newborn examination may be developing, but examination of the newborn practitioners must continue to acknowledge the importance of an evidence base to underpin and validate practice. Therefore, practitioners must engage with current empirical evidence and embrace the research process. As the body of midwives and neonatal nurses who are trained to conduct the newborn screen examination is relatively small, in comparison to our medical colleagues, it is important that we contribute to the evidence in order to take practice initiatives forward.

Conclusion

Good history taking has always underpinned effective medicine. However, the nature of the history profile has changed through the incorporation of government directives and a public policy agenda. The UK NSC Antenatal and Newborn Screening Programme can be mapped to the history-taking process to help guide the practitioner towards gathering the relevant information. Whilst the maternal obstetric, surgical and medical history remains firmly implicit with the history-taking process, the psychosocial agenda now reflects the challenges

facing families coupled with today's parental lifestyle choices. It can be strongly argued that parental psychosocial influences can impact directly upon not only the newborn period but also childhood and indeed adulthood. The newborn physical examination provides a platform to address some of these issues so that interventional measures can be implemented at an early stage. This may go some way to help direct parents and safeguard the vulnerable newborn, thereby protecting the health of a future generation. History taking remains an active element of the newborn examination. Without it, the clinical validity of the newborn examination itself could indeed be negligible.

This chapter provides an overview and context of the changing and dynamic nature of history taking as part of the newborn physical examination. The following websites will provide additional specific information and resources:

Clinical Condition	Useful website
Congenital heart defect	http://www.nhs.uk/conditions/congenital-heart-disease/Pages/Introduction.aspx http://www.bhf.org.uk/healthcare-professionals.aspx?sc_id=FrontNAV-Healthcare http://newbornphysical.screening.nhs.uk/ http://pathways.nice.org.uk/pathways/structural-heart-defects?fno=1
Developmental dysplasia of the hips	http://newbornphysical.screening.nhs.uk/ http://www.steps-charity.org.uk/
Eye conditions	http://newbornphysical.screening.nhs.uk/ http://www.rnib.org.uk/?gclid=CJOErMnopsACFSXKtAodUEcAWg http://www.nhs.uk/Conditions/Cataracts-childhood/Pages/Introduction.aspx http://www.nhs.uk/Conditions/retinoblastoma/Pages/Introduction.aspx http://www.childrenwithcancer.org.uk/News/retinoblastoma?gclid=CPKz6I3ppsACFabLtAodbBwANA
Undescended testes	http://www.nhs.uk/conditions/undescendedtesticles/Pages/Introduction.aspx http://www.nlm.nih.gov/medlineplus/ency/article/000411.htm
BCG vaccination	http://www.nidirect.gov.uk/bcg-vaccination http://www.nhs.uk/Conditions/vaccinations/Pages/bcg-tuberculosis-TB-vaccine.aspx
Metabolic diseases	http://www.bimdg.org.uk/site/index.asp
NICE and national guidance documents	
Antenatal and postnatal mental health: Clinical management and service guidance	https://www.nice.org.uk/Guidance/CG45
Antibiotics for early-onset neonatal infection: Antibiotics for the prevention and treatment of early-onset neonatal infection	http://www.nice.org.uk/guidance/CG149

Neonatal jaundice	http://pathways.nice.org.uk/pathways/neonatal-jaundice?fno=1
CHD	http://pathways.nice.org.uk/pathways/structural-heart-defects?fno=1
Reducing differences in the uptake of immunisations	http://www.nice.org.uk/guidance/PH21
Drug misuse – opioid detoxification	http://www.nice.org.uk/guidance/CG52
UK NSC Antenatal and Newborn Screening Programmes	http://fetalanomaly.screening.nhs.uk/
	http://infectiousdiseases.screening.nhs.uk/
	http://sct.screening.nhs.uk/
	http://cpd.screening.nhs.uk/nipe
	http://newbornphysical.screening.nhs.uk/
	http://newbornbloodspot.screening.nhs.uk/
	http://hearing.screening.nhs.uk/

References

Abu-Harb M, Hey E, Wren C (1994) Death in infancy from unrecognised heart disease. *Archives of Disease in Childhood* **71**, 3–7. Available from: www.fn.bmj.com (accessed July 2014).

Anderson ME, Johnson DC, Batal HA (2005) Sudden infant death syndrome and prenatal maternal smoking: rising attributed risk in the back to sleep era. *BMC Medicine* **3**, 4. Available from: http://www.biomedcentral.com/1741–7015/3/4 (accessed July 2014).

Battin M, Sadler L (2010) Neonatal intensive care utilization and neonatal outcome of infants born to women aged 40 years and over in New Zealand. *Acta Paediatrics* **99**(2), 219–224. Available from: http://onlinelibrary.wiley.com/doi/10.1111/j.1651-2227.2009.01581.x/epdf (accessed February 2015).

Baxter JK, Sehdev HM, Breckenbridge MD (2010) Oligohydramnios. eMedicine Radiology. Available from: http://emedicine.medscape.com/article/405914-overview (accessed July 2014).

Bhattacharya S, Campbell DM, Liston WA, Bhattacharya S (2007) Effect of Body Mass Index on pregnancy outcomes in nulliparous women delivering singleton babies. *BMC Public Health* **7**, 168.

Blake D (2008) Assessment of the neonate: involving the mother. *British Journal of Midwifery* **16**(4), 224–226.

Bornstein MH, Putnick DL, Suwalsky JTD, Gini M (2006) Maternal chronological age, prenatal and perinatal history, social support and parenting of infants. *Child Development* **77**(4), 875–892.

Bradley JP, Bacharier LB, Bonfiglio J, Schechtman KB, Strunk R, Storch G, Castro M (2005) Severity of respiratory syncytial virus bronchiolitis is affected by cigarette smoke exposure and atopy. *Pediatrics* **115**, e7–e14

British Medical Association (2004) *Smoking and Reproductive Life; The Impact of Smoking on Sexual Reproductive and Child Health*. London: Board of Science and Education and Tobacco Control Resource Centre.

CareQuality Commission (2009) Review of the involvement and action taken by health bodies in relation to the case of Baby P. CQC. https://www.whittington.nhs.uk/document.ashx?id=1660 (accessed February 2015).

Carpenter RJ, Hale BR, Chan Tack M (2009) Early symptomatic HIV infection. *eMedicine*. Available from: http://reference.medscape.com/article/211873-overview (accessed February 2015).

CEMACH (2008) *Why Children Die: A Pilot Study*. London: CEMACH. Available from: www.cemach.org.uk.

CEMD (2002) *Why Mothers Die 1997–1999*. London: RCOG.

Cleveland Report (1988) *Report of the Inquiry into Child Abuse in Cleveland 1987*. Cmd 412. London: HMSO.

CMACE/RCOG (2010) *Joint Guidance: Management of Women with Obesity in Pregnancy*. London: Centre for Maternal and Child Enquires and Royal College of Obstetricians and Gynaecologists.

Dawson DA (2003) Methodological issues in measuring alcohol use. *Alcohol Research and Health* **27**, 18–29 http://pubs.niaaa.nih.gov/publications/arh27-1/18-29.htm

Department of Health (2004) National Service Framework for Children, Young People and Maternity Services. www.dh.gov.uk/en/healthcare/nationalserviceframewroks/childrenservices/childrenservicesinformation/dh_4089111 (accessed February 2015).

Devereux G, Barker RN, Seaton A (2002) Antenatal determinants of neonatal immune responses to allergens. *Clinical Experimental Allergy* **32**(1), 43–50.

DH (2007) *Maternity Matters: Choice, Access and Continuity of Care in a Safe Service*. London.HMSO Department of Health Available at: http://dera.ioe.ac.uk/9429/1/dh_074199.pdf (accessed August 2014).

Disney EAR, Iacono W, McGue M, Tully E, Legrand L (2008) Strengthening the case: prenatal alcohol exposure is associated with increased risk for conduct disorder. *Pediatrics* **122**, e1225-e1230.

Ewer AK, Furmston AT, Middleton LJ, Deeks JJ, Daniels JP, Pattison HM, Powell R, Roberts TE, Barton P, Auguste P, Bhoyar A, Thangaratinam S, Tonks AM, Satodia P, Deshpande S, Kumararatne B, Sivakumar S, Mupanemunda R, Khan KS (2012) Pulse Oximetry as a screening test for congenital heart defects in newborn infants: a test accuracy study with evaluation of acceptability and cost-effectiveness. *Health Technology Assessment* **16**(2), 1366–5278. Health Technology Assessment HTA Programme.

Gilliland, FD et al. (2001) Effects of maternal smoking during pregnancy and environmental tobacco smoke on asthma and wheezing in children *American Journal of Respiratory Critical Care Medicine*, **163**(2), 429–436.

Green RF (2007) Summary of working group meeting on use of family history information in pediatric primary care and public health. *Pediatrics*, **120**, S87–S100. http://www.pediatrics.org/cgi/content/full/120/supplement_2/s87 (accessed 16 February 2010).

Green K, Oddie S (2008) The value of the postnatal examination in improving child health. *Arch. Dis. Child. Fetal Neonatal Ed.* **93**: F389-F393.

Haines CJ, Rogers MS, Leung DH (1991) Neonatal outcome and its relationship with maternal age *Australian and New Zealand Journal of Obstetrics and Gynaecology* **31**(3), 209–212.

Hamden AH (2009) Neonatal Abstinence Syndrome. *eMedicine*. Available http://emedicine.medscape.com/article/978763-overview (accessed February 2015).

Haringey Local Safeguarding Children Board (2008) *Serious Case Review. Child A. Executive Summary*. London: Haringey Local Safeguarding Children Board.

Health Canada (2005) Important safety information on Paxil (paroxetine) and increased risk of cardiac defects following exposure during first trimester of pregnancy: for health professionals. GlaxoSmithKline, Inc. Available from: www.hc-sc.gc.ca (accessed July 2014).

Hien D, Honeyman T (2000) A closer look at the drug abuse: maternal aggression link. *Journal of Interpersonal Violence* **15**, 503. Available from: http://www.gsk.ca/english/docs-pdf/PAXIL_PregnancyDHCPL_E-V4.pdf (accessed February 2015).

Hofhuis W, de Jongste JC, Merkus PJFM (2003) Adverse health effects of prenatal and postnatal tobacco smoke exposure on children. *Archives of Disease in Childhood* **88**, 1086–1090. Available from: www.archdischild.com (accessed 20 January 2011).

House of Commons Health Committee (2003) *The Victoria Climbié Inquiry Report*. London: Stationery Office http://www.publications.parliament.uk/pa/cm200203/cmselect/cmhealth/570/570.pdf (accessed July 2014).

Howard FM (2008) History-taking and interview techniques and the physician–patient relationship. *Global Library of Women's Medicine* **1756–2228**. DOI: 10.3843/GLOWM.10411. Available from: http://www.glowm.com/index.html?p=glowm.cml/section_view&articleid=410 (accessed July 2014).

Jacobson SW, Chiodo LM, Sokol RJ, Jacobson JL (2002) Validity of maternal report of prenatal alcohol, cocaine, and smoking in relation to neurobehavioral outcome. *Pediatrics* **109**, 815–825. Available from: www.pediatrics.org (accessed July 2014).

Kalk P, Guthman F, Krause K, Delle K, Godes M, Gosing G, Halle H, Wauer R, Hocher B (2009) Impact of maternal mass index on neonatal outcome. *European Journal of Medical Research* **14**(5), 216–222.

Khalid Y, Ghina M, Fadi B, et al. (2006) Consanguineous marriage and congenital heart defects: a case–control study in the neonatal period. *American Journal of Medical Genetics. Part A* **140**(14), 1524–1530.

Khashan AS, Kenny LC (2009) The effects of maternal body mass index on pregnancy outcome. *European Journal of Epidemiology* **24**(11), 697–705.

Knowles R, Griebsch I, Dezateux C, Brown J, Bull C, Wren C (2005) Newborn Screening for congenital heart defects: a systematic review and cost-effectiveness analysis. *Health Technology Assessment HTA Programme* **9**(44).

La Souef PN (2000) Pediatric origins of adult lung diseases. 4. Tobacco related lung diseases begin in childhood. *Thorax* **55**, 1063–1067.

Lall A (2008) Neonatal abstinence syndrome. *British Journal of Midwifery* **16**(4), 220–223.

Landau LI (2001) Parental smoking: asthma and wheezing illnesses in infants and children. *Paediatric Respiratory Reviews* **2**, 202–206.

Leggate J (2008) Improving pregnancy outcomes: mothers and substance misuse. *British Journal of Midwifery* **16**(3), 160–165.

Leonard NR, Gwardz MV, Cleland CM, Vekaria PC, Ferns B (2007) Maternal substance use and HIV status: adolescent risk and resilience. *Journal of Adolescence* **3**, 389–405. Available from: www.sciencedirect.com (accessed July 2014).

Matturi L, Ottaviani G, Lavezzi AM (2006) Maternal smoking and sudden infant death syndrome: epidemiological study related to pathology. *Virchows Archiv* **449**(6), 697–706. Available from: www.springerlink.com/content/p50475078hpl0128 (accessed July 2014).

Maughan B, Taylor C, Taylor A (2001) Pregnancy smoking and childhood conduct problems: a causal association? *Journal of Child Psychology and Psychiatry* **42**(8), 1021–1028.

McMartin KI, Platt MS, Hackman R, et al. (2002) Lung tissue concentrations of nicotine in sudden infant death syndrome (SIDS). *Journal of Pediatrics* **140**, 205–209.

Mone SM, Gillman MW, Miller TL, Herman EH, Lipshultz SE (2004) Effects of environmental exposures on the cardiovascular system: prenatal period through adolescence. *Pediatrics* **113**(3), 1058–1069. Available at: http://pediatrics.aappublications.org/content/113/Supplement_3/1058.full (accessed August 2–14).

Moore M, Rifas-Shiman MPH, Rich-Edwards JW, Kleinman KP, Camargo CA, Gold D, Weiss ST, Gillman M (2004) Perinatal predictors of atopic dermatitis occurring in the first six months of life. *Pediatrics* **113**, 468–474. Available from: http://www.pediatrics.org/cgi/content/full/113/3/468 (accessed 12 January 2010).

Murray KC, Millar K, Pearson M (2007) Perinatal/neonatal n presentation. *Journal of Perinatalogy* **27**, 517–518.

National Collaborating Centre for Maternal Health (2007) *Antenatal and Postnatal Mental Health: The NICE Guideline On Clinical Management and Service Guidance*. London: NICE, for the British Psychological Society and the Royal College of Psychiatrists. www.nice.org.uk.

National Patient Safety Agency (2011) Rapid Response Report – keeping newborn babies with a family history of MCADD safe in the first few hours and days of life. Safety Alert 2. Available from: http://www.nrls.npsa.nhs.uk/resources/?EntryId45=132858 (accessed August 2014)

NHS ANSP (2008) Sickle cell and thalassaemia. Information for midwives. Available from: http://www.screening.nhs.uk.

NHS FASP (2010) Update on NIPD (Non-Invasive Prenatal Diagnosis. Available from: www.fetalanomaly.screening.nhs.uk (accessed July 2014).

NHS, Greater Manchester Public Health Network (2009) The Greater Manchester Down's Syndrome Screening Programme. Available from: www.northwest.nhs.uk (accessed July 2014).

NHS QIS (2008) Best practice statement: routine examination of the newborn. Available from: www.nhshealthquality.org (accessed July 2014).

NHSQIS (2004) Best Practice Statement: Routine Examination of the Newborn. Available from: www.nhshealthquality.org (accessed July 2014).

NICE (2006a) Routine Postnatal Care of Women and Their Babies. NICE clinical guideline 37. National Institute of Health and Care Excellence. Available from: www.nice.org.uk/CG037 (accessed July 2014).

NICE (2006b) Therapeutic Amnioinfusion for Oligohydramnios during Pregnancy (Excluding Labour). IPG 192. National Institute of Health and Care Excellence. Available from: www.nice.org.uk/guidance/IPG192 (accessed July 2014).

NICE (2007) *Intrapartum Care: Care of Healthy Women and Their Babies During Childbirth. Clinical Guideline.* London: RCOG Press. Available from: http://www.nice.org.uk/nicemedia/live/11837/36275/36275.pdf (accessed July 2014).

NICE (2010) Quitting smoking in pregnancy and following childbirth. Quick reference guide. National Institute of Health and Care Excellence. Available from: http://www.nice.org.uk/nicemedia/live/13023/49346/49346.pdf (accessed July 2014).

NICE (2012) NICE Clinical Guidance for Antibiotics for Early-Onset Neonatal Infections. National Institute of Health and Care Excellence. Available from: http://www.nice.org.uk/guidance/CG149/resources (accessed August 2014).

NPSA (2009) *Review of Patient Safety for Children and Young People*. London: NHS.

Ohlsson A, Shah VS (2009) Intrapartum antibiotics for known maternal Group B streptococcal colonization. *Cochrane Database of Systematic Reviews* **3**, CD007467. DOI: 10.1002/14651858.CD007467.pub2. Available from: http://mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD007467/pdf_standard_fs.html (accessed July 2014).

Olson H, Streissguth A, Sampson P, Barr H, Bookstein F, Theide K (1997) Association of prenatal alcohol exposure with behavioural and learning problems in early adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry* **36**(9), 1187–1194. Cited by Disney et al. (2008), Op cite.

Rajiah P (2009) Polyhydramnios. *eMedicine Radiology*. Available from: http://emedicine.medscape.com/article/404856-overview (accessed February 2015).

Ramegowda S, Ramachandra NB (2006) Parental consanguinity increases congenital heart diseases in South India. *Annals of Human Biology* **33**(5–6), 519–528.

RCOG (2003) Prevention of Early Onset Neonatal Group B Streptococcal Disease. Available from: http://www.rcog.org.uk/womens-health/clinical-guidance/prevention-early-onset-neonatal-group-b-streptococcal-disease-green- (accessed July 2014).

Roebuck TM, Mattson SN, Riley EP (1999) Behavioural and psychosocial profiles of alcohol-exposed children. *Alcoholism, Clinical and Experimental Research* **23**(6), 1070–1076 cited in Disney et al. (2008). Op cit.

Romano-Zelekha O, Hirsh R, Blieden L, Gree MS, Shohat T (2001) The risk of congenital heart defects in offspring of individuals with congenital heart defects. *Clinical Genetics* **59**, 325–329.

Romitti PA (2007) Utility of family history reports of major birth defects as a public health strategy. *Pediatrics* **120**, s71–s77. Available from: http://www.pediatrics.org/cgi/content/full/120/supplement_2/s71 (accessed July 2014).

Ryan K, Bain B, Worthington D, James J, Plews D, Mason A, Roper D, Rees DC, de la Salle B, Streetly A (2010) Significant haemoglobinopathies: guidelines for screening and diagnosis. *British Journal of Haematology* **149**, 35–49.

Salem L, Singer KR (2009) Rh incompatibility. *eMedicine*. Available from: http://emedicine.medscape.com/article/797150-overview (accessed February 2014).

Sanz EJ, Delas-Cuevas C, Kiuru A, Bate A, Edwards R (2005) Selective serotonin receptor uptake inhibitors in pregnant women and neonatal withdrawal syndrome: a data analysis. *Lancet* **365**(9458), 482–487.

Sayal K (2007) Alcohol consumption in pregnancy as a risk factor for later mental health problems. *Evidence-Based Mental Health* **10**, 98–100.

Sayal K, Heran J, Golding J, Alati R, Smith GD, Gray R, Emond A (2009) Binge pattern of alcohol consumption during pregnancy and childhood mental health outcomes: longitudinal population-based study. *Pediatrics* **123**(2), E289–E296. Available from: http://pediatrics.aapublications.org/cgi/contnent/abstract/123/2/e289 (accessed July 2014).

Sebire NJ, Jolly M, Harris JP, Wadsworth J, Joffe M, Beard RW, Regan L, and Robinson S (2001) Maternal obesity and pregnancy outcome: a study of 287,213 pregnancies in London. *International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity* **25**(8), 1175–1182.

Sellwood M, Huertas-Ceballos A (2008) Review of NICE guidelines on routine postnatal infant care. *Archives of Disease in Childhood. Fetal And Neonatal Edition* **93**, F10–F13. Available from: www.fn.bmj.com (accessed July 2014).

Sharland G (2010) Fetal cardiac screening: why bother? *Archives of Disease in Childhood. Fetal And Neonatal Edition* **95**, F64–F68. Available from: www.fn.bmj.com (accessed July 2014).

Skills for Health (2004) *National Workforce Framework for Maternity and Care of the Newborn*. London: Department of Health. Available from: https://tools.skillsforhealth.org.uk/suite/show/id/23 (accessed July 2014).

Smith LM, LaGasse, Derauf C, Grant P, Shah R, Arria A, Huestis M, Haning W, Strauss A, Grotta SD, Liu J, Lester BM (2006) The infant development, environment and lifestyle study: Effects of prenatal methamphetamine exposure, polydrug exposure, and poverty on intrauterine growth. *Pediatrics* **118**, 1149–1156. Available from: http://www.pediatrics.org/cgi/content/full/118/3/1149 (accessed July 2014).

Stiskal PA, Kulin N, Koren G, Ho T, Ho S (2001) Neonatal paroxetine withdrawal syndrome. *Archives of Disease in Childhood. Fetal And Neonatal Edition* **84**, F134–F135. Available from: http://fn.bmj.com/content/84/21 (July 2014).

Stocks J, Dezateux C (2003) The effects of parental smoking on lung function and development during infancy. *Respirology* **8**, 266–285.

Stoeckle JD, Billings JA (1987) A history of history-taking. *Journal of General Internal Medicine* **2**(2), 119–127.

Thangaratinam S, Brown K, Zamora J, Khan KS, Ewer AK (2012) Pulse Oximetry:screening for critical congenital defects in asymptomatic newborn babies: a systematic review and meta analysis. *Lancet* **379**(9835), 2459–2464.

UK NHS Fetal Anomaly Screening Programme (2010) http://fetalanomaly.screening.nhs.uk/ (accessed February 2015).

UK NSC (2006a) Fetal Anomaly Ultrasound Screening Flow Chart. Available from: http://www.screening.nhs.uk/fetalanomaly/home.htm (accessed 15 July 2014).

UK NSC (2006b) Statement on Soft Markers on the 18–20 Week Anomaly Scan. Available from: http://www.screening.nhs.uk/downs/risk_recalculation_lepdf (accessed 15 July 2010).

UK NSC (2007) *Consent and Standards for Fetal Anomalies during Pregnancy 2007*. London: UK NSC.

UK NSC (2008) *Newborn and Infant Physical Examination: Standards and Competencies*. London: UK NSC. Available from: www.screening.nhs.uk/home.htm (accessed August 2014).

Ungerer RLS, Lincetto O, McGuire W, Saloojee HH, Gülmezoglu AM (2004) Prophylactic versus selective antibiotics for term newborn infants of mothers with risk factors for neonatal infection. *Cochrane Database of Systematic Review* **4**: CD003957. DOI: 10.1002/14651858.CD003957.pub2. Available from: http://www2.cochrane.org/reviews/en/subtopics/82.html (accessed July 2014).

Valmari P (2007) Should pulse oximetry be used to screen for congenital heart disease? *Archives of Disease in Childhood. Fetal And Neonatal Edition* **92**(3), F219–F224. Available from: www.fn.bmj.com (accessed July 2014).

Victoria Climbié Inquiry (Lord Laming Chair) (2003) Summary and Recommendations. HMSO.

Viegas OAC, Leong WP, Ahmed S, Ratham SS (1994) Obstetric outcome with increasing maternal age. *Journal of Biosocial Science* **26**, 261–267. Available from: http://journals.cambridge.org/action/displayAbstract;jsessionid=CED579E77A4611A7BA14B2F5C3D97E0A.tomcat1?fromPage=online&aid=1640316 (accessed July 2014).

Volpi-wise M (2005) Neonatal Abstinence Syndrome. Available from: http://bach.fhs.usyd.edu.austu/hse/iec/volpiwisem/html (accessed July 2014).

Wadonda-Kabondo N, Sterne JAC, Golding J, Kennedy CTC, Archer CB, Dunnill MGS (2004) Association of parental eczema, hayfever, and asthma with atopic dermatitis in infancy: birth cohort study. *Archives of Disease in Childhood* **89**, 917–921. Available from: www.adc.bmj.com (accessed July 2014).

Wang M (2010) Perinatal drug abuse and neonatal drug withdrawal. *eMedicine*. Available from: http://emedicine.medscape.com/article/978492-overview (accessed February 2015).

Wren C, Reinhardt Z, and Khawaja K (2007) Twenty-year trends in diagnosis of life-threatening neonatal cardiovascular malformations. *Archives of Disease in Childhood. Fetal And Neonatal Edition* **93**, 33–35. Available from: www.fn.bmj.com (accessed July 2014).