Rash (Neonatal)

Definition / Supporting Information

Skin conditions in the newborn vary from transitory, benign processes, such as erythema toxicum neonatorum, to important markers of systemic disease or congenital malformations.

Recognising and describing skin lesions accurately are essential to diagnosis. The distribution, arrangement and colour of primary lesions, along with any secondary changes, such as crusting or scaling, should be described.

Keywords / also known as: newborn rash, skin conditions, preterm skin rash

Essential History

Ask about:

- The timing of the appearance of lesions
  - The primary lesion is the earliest and most characteristic of the disease
  - Port-wine stains are always present at birth
  - Erythema toxicum neonatorum appears in the first 24–48 hours after the birth
  - Infantile haemangiomas appear in the first month of life
  - Incontinentia pigmenti presents with blistering but, by the end of first month, blisters are followed by the appearance of warty papules
  - Purpura fulminans skin lesions appear within a few days of birth, often within a few hours
- The appearance of primary lesions (Tables 1-5)
  - Flat lesions
    - Macules
    - Patches
  - Elevated lesions, which may be solid or fluid-filled
    - Elevated solid lesions: papules, nodules, wheals, plaques
    - Elevated fluid-filled lesions: vesicles, bullae, pustules, cysts
  - Depressed lesions
    - Erosions
    - Ulcers
- The distribution of the lesions
  - Certain disorders have unique patterns of distribution; noting the parts of the body involved helps with the diagnosis

        - Infantile seborrhoeic dermatitis commonly involves the scalp, forehead, eyebrows, ears, nasolabial folds, and retro-auricular area
        - Neonatal acne is limited to the face and scalp
        - Infantile acropustulosis has an acral rather than a truncal distribution
    - Linear lesions
        - Lesions that follow Blaschko lines are indicative of somatic mosaicism (ie, epidermal naevus, incontinentia pigmenti)
- The colour of the lesions
    - Skin coloured
    - Erythematous (pink or red)
        - Urticaria: compression of the skin causes blanching
        - Petechiae and purpura, ecchymoses: compression of the skin does not cause blanching
        - Purpura fulminans lesions are erythematous in early stages. Rapidly progress to blue-black areas of haemorrhagic necrosis (Figures 5-6)
    - Hyperpigmented
        - Tan
        - Brown
        - Black
    - Hypopigmented
        - Pigment is decreased but not entirely absent
    - Depigmented
        - All pigment is absent, as in vitiligo
    - Violaceous
- The presence of crusting or scaling (secondary changes)
    - Crusting (dried fluid)
        - Commonly seen after the rupture of vesicles or bullae (eg, the honey-coloured crust of impetigo)
- Maternal, family, perinatal and neonatal history
    - Family history of skin or mucous membrane disease, blistering, skin fragility, or birthmarks
    - History of significant systemic disease or genetic disorders
    - History of maternal infections
    - Medications used during pregnancy
    - Spontaneous abortions of previous pregnancies
        - May suggest X-linked dominant conditions
    - Other affected family members
        - Suspect cutaneous infections or infestations if others are affected at the same time

‘Red Flag’ Symptoms And Signs

Ask about:

- Risk factors for serious illness:
  - Poor feeding (see Appetite Loss)
  - Does not wake or, if roused does not stay awake
  - Weak, high-pitched, or continuous cry
  - Fever
  - Rigors

Look for:

- Evidence of serious illness in Fever in under 5s: assessment and initial management (see Traffic light system for identifying risk of serious illness [NICE clinical guideline CG160, section 1.2.4, Table 1])
  - Pale, mottled, ashen, blue skin, blue lips, or blue tongue
  - No response to social cues
  - Grunting
  - Respiratory rate greater than 60 breaths per minute
  - Moderate or severe chest in-drawing
  - Tachycardia
  - Prolonged capillary refill ≥ 3 seconds
  - Reduced skin turgor
  - Bulging fontanelle
  - Non-blanching rash
  - Blue-black necrotic areas of purpura fulminans (Figures 5-6)
  - Neck stiffness
  - Focal neurological signs
  - Focal seizures
  - Cardiac murmurs (infective endocarditis)
  - Faltering growth (eg, cow milk protein allergy, atopic dermatitis, congenital ichthyosis)
- Pustules and vesicles in a newborn who is unwell
  - Consider herpes simplex infection
- Congenital widespread desquamation with or without redness (erythroderma)
  - Consider ichthyosis and immunodeficiency (eg, Omenn syndrome)
- ‘Collodion baby’
  - Newborn baby encased in a tight, yellow, shiny film at birth
    - Usually related to ichthyosis and possibly to metabolic disease (eg, Gaucher disease, type 2)
- Congenital vascular tumour

  - May cause high-output heart failure
- 'Blueberry muffin syndrome' (purpura and blue / purple marks or nodules in the skin)
- Consider rubella, cytomegalovirus, metastatic neuroblastoma,congenital leukemia (see PHE Green Book, Chapter 28)

Differential Diagnosis / Conditions

Table 1. Types of flat lesion

Types of flat lesion (description)	Frequency	Colour	Examples
Macules (small, circumscribed area of colour change without elevation or depression)	Common	Hypopigmented (skin coloured or blue / purple)	Prehaemangioma
			Postinflammatory hypopigmentation
		Hyperpigmented	Transient neonatal pustular melanosis
			Cafe au lait macule
			Postinflammatory hyperpigmentation
			Congenital melanocytic naevus
	Uncommon	Hypopigmented	Ash-leaf macule
Patches (flat, non-palpable lesion ≥ 1 cm in diameter)	Common	Erythematous	Salmon patch (naevus simplex)
			Haemangioma (early)
			Port-wine stain (Figure 1)
			Atopic dermatitis
			Seborrhoeic dermatitis
			Nappy rash
		Hyperpigmented	Dermal melanosis
			Lentigo
			Congenital melanocytic naevus
	Uncommon	Erythematous	Acrodermatitis enteropathica (Figure 2)
		Hyperpigmented	Pigment mosaicism
		Hypopigmented	Pigment mosaicism
			Naevus depigmentosus
	Rare	Blue-black	Purpura fulminans

Table 2 Types of solid, elevated lesion

Types of solid, elevated lesion (description)	Frequency	Colour	Examples
Papules (< 0.5 cm in diameter)	Common	Erythematous	Erythema toxicum
			Miliaria rubra
			Acne (Figure 3)
			Candidiasis
			Scabies
		White	Milia
		Yellow	Sebaceous gland hyperplasia
		Skin coloured	Epidermal naevus
	Uncommon	Yellow / tan	Mastocytosis
			Juvenile xanthogranuloma
Nodules (≥ 0.5 cm in diameter)	Common	Erythematous	Haemangioma
	Uncommon	Yellow / tan	Mastocytosis
Plaques	Common	Skin coloured or yellow	Naevus sebaceous
		Skin coloured	Epidermal naevus
Wheals (pink, rounded, or flat-topped elevation caused by oedema in the skin)	Common	Erythematous	Urticaria

Table 3 Types of fluid-filled, elevated lesions

Types of fluid-filled, elevated lesions (description)	Frequency	Colour	Examples
Vesicles (< 0.5 cm in diameter and filled with serous fluid) or bullae (≥ 0.5 cm in diameter and filled with serous fluid)	Common		Erythema toxicum
			Miliaria crystallina
			Sucking blisters
			Bullous impetigo
			Herpes simplex virus infection
	Uncommon		Incontinentia pigmenti
			Aplasia cutis congenita
			Varicella (Figure 4)
			Epidermolysis bullosa
			Epidermolytic ichthyosis
			Mastocytosis
			Erythema toxicum
Pustules (< 0.5 cm in diameter and filled with purulent material)	Common		Transient neonatal pustular melanosis
			Miliaria pustulosa
			Herpes simplex virus infection
			Folliculitis
			Acne
			Scabies
	Uncommon		Acropustulosis of infancy

Table 4 Types of depressed lesion

Types of depressed lesion (description)	Frequency	Colour	Examples
Erosions (superficial loss of epidermis with a moist base)		Common	Bullous impetigo (after bullae rupture)
			Herpes simplex virus infection (after vesicle rupture)
			Staphylococcal scalded skin syndrome
		Uncommon	Aplasia cutis congenita
			Acrodermatitis enteropathica
			Epidermolysis bullosa
			Epidermolytic ichthyosis

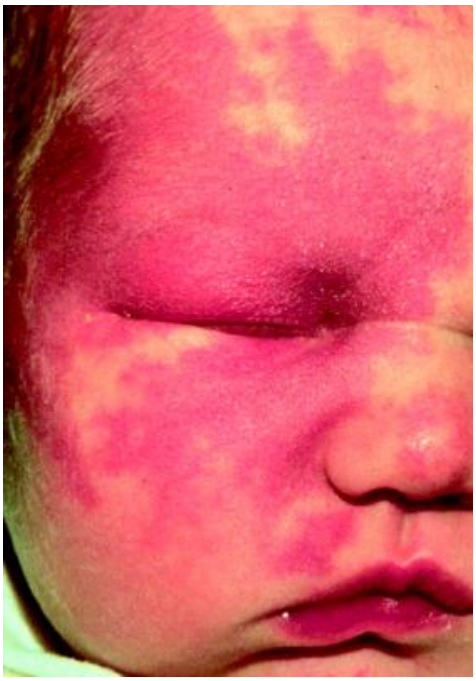

Figure 1: A port-wine stain is an example of an erythematous patch

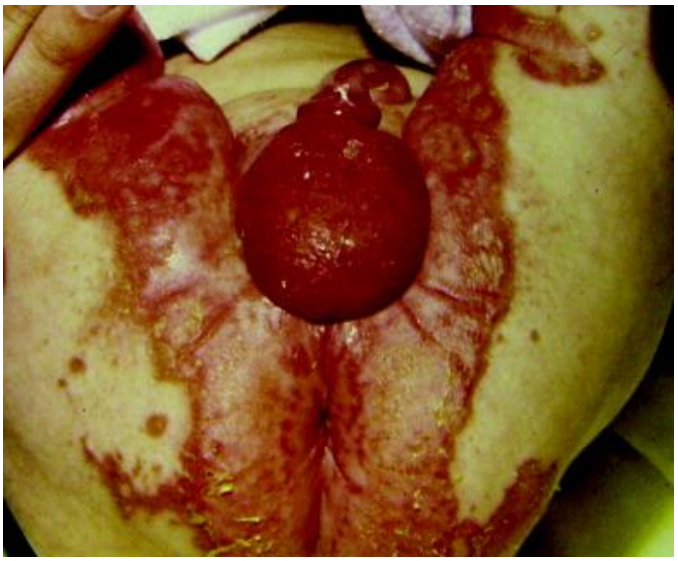

Figure 2: Erosions, as seen in this infant who has acrodermatitis enteropathica, represent a superficial loss of epidermis

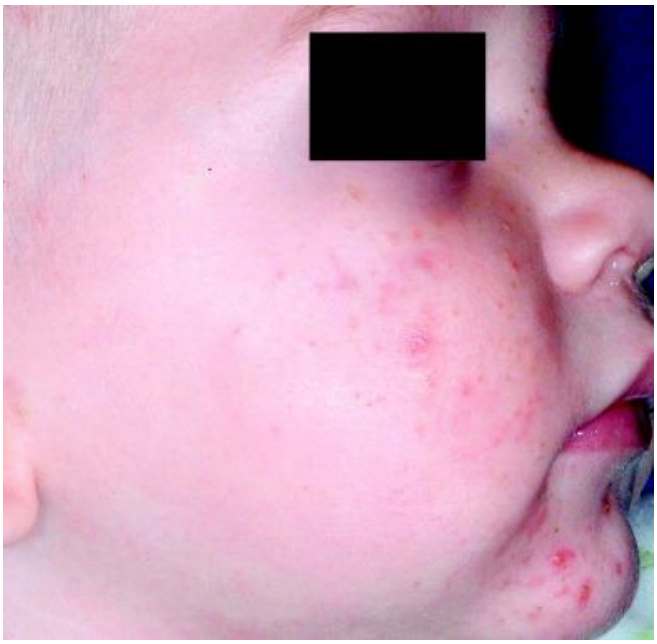

Figure 3: Neonatal acne is composed of erythematous papules and papulopustules

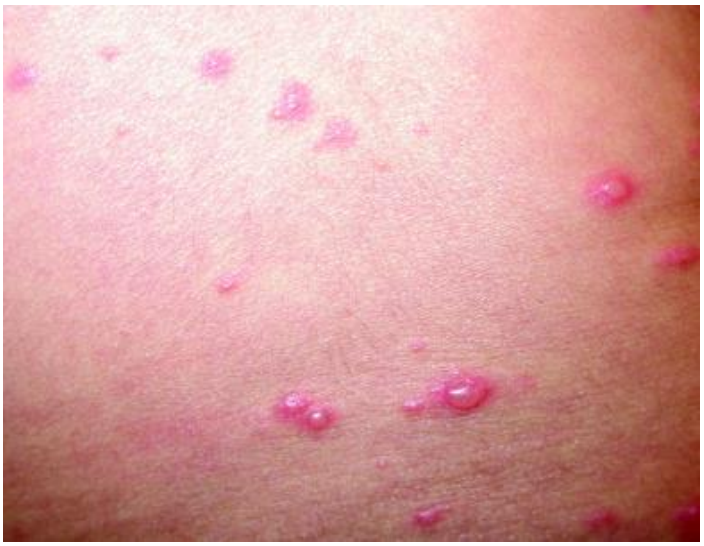

Figure 4: Vesicles, as seen here in varicella, are filled with clear or serous fluid

Investigations

The content within this section is based largely on expert opinion. Further information is available in Paediatric Dermatology, Oxford Specialist Handbooks in Paediatrics, and in Neonatal and Infant Dermatology (3rd edition), Elsevier.

Most rashes do not require investigation.

To be undertaken by non-specialist practitioners (eg, GP Team), or specialist practitioners (eg, Paediatric / Paediatric Emergency Department / Neonatology / (Paediatric) Dermatology Team(s)):

- Swab lesion if:
  - *Candida* or bacterial infection is suspected
    - Microscopy, culture, and sensitivity (MC&S)
    - *Candida* nappy rash is often treated without taking swabs in an otherwise well newborn; however, if the condition is not responsive to treatment, investigation may be indicated
  - Neonatal vesicular eruption
    - Test for herpes simplex virus (eg, by polymerase chain reaction (PCR))
  - Neonatal pustular eruption
    - MC&S
    - PCR for herpes simplex virus, varicella-zoster virus, and cytomegalovirus
    - Skin scrapings for scabies

- Consider full blood count and coagulation studies if any of the following occur:
  - Petechial or purpuric rash
    - Consider also septic screen in unwell patients
    - Protein C and Protein S levels, septic screen if purpura fulminans
  - Vascular tumours or malformations
  - Multiple cutaneous haemangiomas (more than 5)
- Consider measuring the serum zinc concentration if there are:
  - Erosions and crusting around the mouth and anus, raising suspicion of acrodermatitis enteropathica
- Consider blood samples to test for:
  - Collodion membrane
  - Autosomal Recessive Congenital Ichthyosis (ARCI)
  - Netherton syndrome
  - Epidermolysis bullosa

Imaging

- Consider magnetic resonance imaging (MRI) if any of the following are present:
  - Periorbital haemangiomas
    - To evaluate for intraorbital involvement
  - Segmental (ie, plaque-like, involving a large anatomical area) haemangioma involving the face:
    - MRI of the head and neck with contrast and echocardiography (PHACES syndrome; namely, posterior fossa malformations, haemangiomas, arterial anomalies, coarctation of aorta / cardiac abnormalities, eye anomalies, and sternal defects)
- Multiple (more than 2) congenital melanocytic naevi or large melanocytic naevus
  - MRI of the brain and spine
- Consider ultrasonography if any of the following occur:
  - Multiple cutaneous haemangiomas (more than 5)
    - Evaluate for liver involvement
  - Midline lumbosacral lesions (eg, large haemangioma, congenital melanocytic naevus, port-wine stain, hypertrichosis, lipoma)
    - Ultrasonography (if under 3 to 4 months of age) or MRI of the spine to evaluate for possible spinal dysraphism or other spinal cord defects
  - Patients with port-wine stain overlying the frontotemporal area
    - Sturge-Weber syndrome
  - Beard distribution haemangioma
    - Airway haemangiomas

Diagnostic Procedures

- Consider skin biopsy if:
  - The history, physical examination, and laboratory studies fail to provide a diagnosis
  - A histological diagnosis influences therapy
  - A specimen is needed for microbiology culture or special testing (eg, immunofluorescence, electron microscopy, special stains)
  - Concern for malignancy exists (eg, in the setting of a changing melanocytic naevus or suspicion of Langerhans cell histiocytosis)

Treatment Approach

The content within this section is based largely on expert opinion. Further information is available in Paediatric Dermatology, Oxford Specialist Handbooks in Paediatrics, and in Neonatal and Infant Dermatology (3rd edition), Elsevier.

To be undertaken by non-specialist practitioners (eg, GP Team), or specialist practitioners (eg, Paediatric / Paediatric Emergency Department / (Paediatric) Dermatology Team(s)):

- Treatment is based on the diagnosis
  - Usually apparent based on the history and physical examination findings
- Infections should be treated with appropriate antimicrobial agents
- Congenital candidiasis (rare) should be treated at the time of skin presentation with systemic antifungals
- Empirical therapy is reasonable; however, one must evaluate the response to such treatment and proceed accordingly
- It is important to minimise topical toxins and unnecessary drugs in neonates

To be undertaken by specialist practitioners (eg, Paediatric / Paediatric Emergency Department / Neonatology / Paediatric Intensive Care Unit / (Paediatric) Dermatology Team(s)):

- Infantile haemangiomas involving vital structures (eg, periorbital area, airway) or large, disfiguring haemangiomas require treatment with propranolol hydrochloride (starting dose 1 mg/kg/day, increase to 2 mg/kg/day) for at least 6–12 months
- Neonates born with collodion membranes require supportive treatment involving:
  - Nursing in a humidity - and temperature-controlled environment
  - Frequent application of bland emollients such as 50% Liquid Paraffin and 50% White Soft Paraffin Ointment (see emollient creams and ointments, paraffin-containing).
  - Good eye care
  - Monitoring for evidence of infection and fluid and electrolyte imbalance

- Patients with suspected skin fragility (eg, epidermolysis bullosa) should be handled gently and friction should be reduced
  - Tapes and adhesives should not be used on the skin
  - Term infants should not be nursed in an incubator, as a hot and humid environment can encourage blistering
  - Wounds should be covered with non-adherent dressings

When to Refer

Refer urgently to specialist practitioners (eg, Paediatric / Paediatric Emergency Department / Paediatric Oncology / Paediatric Haematology / Paediatric Infectious Disease / (Paediatric) Ophthalmology / (Paediatric) Dermatology Team(s)) if:

- The patient has any 'red flag' signs or symptoms
- Patients are suspected of having an infiltrative disorder (eg, Langerhans cell histiocytosis, congenital leukaemia)
- Patients have periorbital haemangiomas
- Patients are suspected of having immunological disorders
- Patients are suspected of having purpura fulminans
  - Discuss management (eg, protein C concentrate for protein C deficiency) with paediatric haematology team(s)

Refer to (Paediatric) Dermatology Team if:

- The patient has vascular birthmarks (apart from non-complicated infantile haemangioma or a small port-wine stain) and large congenital melanocytic naevi
- The patient has a port-wine stain requiring treatment with a pulsed dye laser
- Patients are suspected of having genetic skin conditions (eg, inherited blistering disease, such as epidermolysis bullosa, ichthyosis syndromes)

'Safety Netting' Advice

Follow-up:

- Advise parents and / or carers to seek urgent medical attention if 'red flag' signs or symptoms develop, or to seek further advice if the patient is not improving
- Chronic disorders (eg, seborrhoeic dermatitis, infantile haemangioma treated with propranolol hydrochloride) require periodic follow-up to assess response to treatment

Patient / Carer Information

Please note: whilst these resources have been developed to a high standard they may not be specific to children.

- Skin rashes in babies (Web Page), the NHS website

- Epidermolysis bullosa (Web Page), the NHS website
- Ichthyosis (Web Page), the NHS website

Resources

National Clinical Guidance

Seborrhoeic Dermatitis (Web page), NICE clinical knowledge summary, National Institute for Health and Care Excellence

Meningitis (bacterial) and meningococcal septicaemia in under 16s: recognition, diagnosis and management (Web Page), NICE clinical guideline CG102, National Institute for Health and Care Excellence

Urticaria (Web page), NICE clinical knowledge summary, National Institute for Health and Care Excellence

Impetigo (Web page), NICE clinical knowledge summary, National Institute for Health and Care Excellence

Acne vulgaris (Web page), NICE clinical knowledge summary, National Institute for Health and Care Excellence.

Nappy Rash (Web page), NICE clinical knowledge summary, National Institute for Health and Care Excellence

Suggested Resources

Please note: these resources include links to external websites. These resources may not have national accreditation and therefore PCO UK cannot guarantee the accuracy of the content.

Lewis-Jones S, ed. Paediatric Dermatology (Oxford Specialist Handbooks in Paediatrics). Oxford: Oxford University Press; 2010

Eichenfield LF, Frieden IJ, Zaenglein A, et al. Neonatal and Infant Dermatology 3rd edn. Philadelphia: Saunders; 2014

Rash (Web page – requires log-in), Spotting the Sick Child

Interventions for infantile haemangiomas of the skin, (Systematic review), Cochrane database of systematic reviews 2018

Antiviral agents for treatment of herpes simplex virus infection in neonates, (Systematic review), Cochrane database of systematic reviews 2009

Kewley KA, Yajamanyam PK. Skin rash in a preterm infant: when to treat? *Arch Dis Child Fetal Neonatal Ed.* 2018;103(2):F177 [Pub Med]

Chalmers E, Cooper P, et al. Purpura fulminans: recognition, diagnosis and management. Archives of Disease in Childhood. 2011;96(11):1066-1071 [PubMed]

Acknowledgements

Content Editor: Dr Jan Dudley

Clinical Expert Reviewer: Dr Lea Solman

GP Reviewer: Dr Janice Allister

AAP Reviewers: Deepak Kamat, MD, PhD, FAAP, Dr Kelly J Kelleher & Jane Meschan Foy, MD, FAAP

Paediatric Trainee Reviewer: Dr Sheilah Zviripi Kamupira

Update reviewer: Dr Rashmi Mehta (trainee paediatrician)

Paediatric Specialty Group: British Society for Paediatric Dermatology

Update information

Created: 2016

Date last updated: 2019

Next review due: 2022