

Table 11.1 Skin Infections					
RASH	DIAGNOSIS	GEOGRAPHY AND RISK FACTORS	RASH/LESION DISTRIBUTION AND CHARACTERISTICS	ASSOCIATED FINDINGS	INVESTIGATIONS AND MANAGEMENT
PAINLESS MIGRATORY LESIONS	Paragonimiasis (Lung fluke) http://www.cdc.gov/parasites/paragonimus/index.html	Asia (especially E Asia), W Africa, Americas Food borne infection from raw or undercooked crab/ crayfish.	Infections may be associated with painless, migratory subcutaneous swellings of various sizes or tender, firm, mobile nodules often on lower abdominal wall, inguinal area and proximal lower extremities.	Typically causes pulmonary disease (haemoptysis, chest pain and shortness of breath), also ectopic cerebral and abdominal infection. May mimic pulmonary TB	Specialist review. FBE for eosinophilia. Chest x-ray.
PRURITIC PAPULAR, VESICULAR OR PUSTULAR RASH	Onchocerciasis http://emedicine.medscape.com/article/1109409-overview http://www.cdc.gov/parasites/onchocerciasis/index.html	Sub-Saharan Africa (especially Nigeria, DRC), SW Arabian peninsula, Latin America; 20-50% prevalence in endemic regions. Blackfly transmission.	Rash onset may be 1-3 years after transmission, variable appearance and changes over time. Initially generalized itch with 1-3mm papules, vesicles or pustules (buttocks/shoulders), followed by larger (3-9mm) papules often hyper-pigmented with blotchy erythema. Subcutaneous nodules containing adult worms (0.5-3cm diameter) occur later, often deep (not palpable), over iliac crests/pelvic girdle. Hyper/depigmentation (patchy) 'leopard skin' over anterior shin (adults). Skin thickening, lichenification, atrophy may occur.	Regional lymphadenopathy, weight loss, musculoskeletal pain. Eye involvement - blindness (esp. W. Africa).	Specialist review. Skin snips – for technique see: http://www.cdc.gov/parasites/onchocerciasis/health_professionals/ FBE for eosinophilia. Pan-filarial antigen (non specific). Polymerase chain reaction (PCR) and antibody testing not readily available.
	Scabies http://www.dermnetnz.org/arthropods/scabies-imgs.html http://www.cdc.gov/parasites/scabies/index.html	Worldwide, common in schoolchildren, long-term care facilities and communal living.	Burrows are 2-3mm long +/- nodules, generalised rash (typically starts in web spaces hands/feet and spares head/neck except in children, elderly). Papules in flexures, vesicles/pustules on palms, soles, scalp. Nodules may occur along posterior axillary line and on male genitalia. Treatment with topical steroids may lead to atypical appearance. May also cause severe pruritus with no rash, or crusted, hyperkeratotic rash, particularly in immunocompromised.	Secondary bacterial infection.	Clinical diagnosis. See (A) below for practice points regarding treatment.
	Varicella http://www.dermnetnz.org/viral/varicella.html	Worldwide, typically occurs at older age in tropical climates, droplet spread, incubation 10-21 days.	Pruritic rash progressing from maculopapular to vesicular, typically 250 – 500 lesions central distribution, cropping over several days to crusted lesions by 5-10 days. Contagious from 1-2 days prior to rash until crusted. High risk to infants with maternal varicella 5 days prior – 2 days after delivery	Fever, irritability, anorexia, lymphadenopathy, may have pneumonia or central nervous system complications, may be associated with secondary infection.	Clinical diagnosis. No treatment for children if immunocompetent (treat if existing significant skin disease e.g. eczema, or impaired T cell immunity). Adults -greater risk of complications - consider treatment within 72 hours of rash onset with oral guanine analogues (e.g. famciclovir). Aspirin contraindicated due to association with Reyes syndrome in children. Exclude from school. Notifiable disease.

Table 11.1 Skin Infections

RASH	DIAGNOSIS	GEOGRAPHY AND RISK FACTORS	RASH/LESION DISTRIBUTION AND CHARACTERISTICS	ASSOCIATED FINDINGS	INVESTIGATIONS AND MANAGEMENT
PRURITIC -OTHER	Tinea http://dermnetnz.org/fungal/tinea.html	Worldwide. Causative agents (<i>Trichophyton</i> spp., <i>microsporum</i> spp.) vary in different geographic areas. Person-person and animal-human transmission depending on species.	Typically well-demarcated erythematous rings with central clearing, scaling, thickening, fi or maceration, +/- nail changes (discolouration/ distortion and subungual debris). Pustules may occur. Tinea capitis may present with scaling, 'black dots' (where hairs within lesion break off), areas of alopecia or papulovesicular eruption – more common in younger children. Early lesions are often overlooked and not noticed until alopecia becomes evident. Untreated Tinea capitis can cause scarring and permanent alopecia.	Kerion – boggy inflammatory mass with follicular pustules – hypersensitivity to fungal infection, may occur with fever/local lymphadenopathy. Infection in multiple family members.	Microscopy and culture (scrapings, subungual debris, nail clippings, hair). See (B) below for management practice points. Investigate and treat family members.
	Tungiasis (<i>Tunga penetrans</i>) http://www.dermnetnz.org/arthropods/tungiasis.html	Central/South America, India, Pakistan, Sub-Saharan Africa, Sandy conditions.	Due to burrowing flea <i>Tunga penetrans</i> . After penetration the flea expands to ~ 1cm over 2 weeks. Lesion typically on feet, initial white patch with central dark dot, developing into painful pruritic papular or nodular eruptions.	Secondary infection, including more severe infections (tetanus, gangrene).	Clinical diagnosis. Specialist review.
	Myiasis ('Botfly') (infestation by fly larvae (maggots) http://www.dermnetnz.org/arthropods/myiasis.html	Tropical and sub-tropical regions, central/South America, Africa and Caribbean.	Slow enlargement of insect bite to 1-3cm nodule, draining scant serosanguineous fluid. May be associated with Irritation, crawling or episodic pain.	Multiple lesions may be present.	Removal of intact larva is curative e.g. by occlusion of the opening with petroleum jelly and gentle extraction on larval protrusion. One larva is found in each lesion.
NON-PRURITIC ERYTHEMATOUS	Secondary syphilis http://www.dermnetnz.org/bacterial/syphilis.html	Worldwide. For prevalence in Australian refugee cohorts see appendix one .	Variable lesions, typically palms and soles or mucosal surfaces, may be more generalised. Maculopapular, papular, annular, or pustular. Ulceration may occur with immunosuppression. Onset weeks to months after primary lesion, which may be unreported.	Fever, headache, malaise, anorexia, lymphadenopathy, diminished visual acuity, posterior uveitis.	Specialist review. See STI chapter 10 Notifiable disease.
	Measles http://www.dermnetnz.org/viral/morbilli.html	Worldwide, infrequent in Australia. Droplet/direct contact spread, incubation 7-18 days	Erythematous blotchy rash, starts at hairline, then moves downwards, becomes confluent. Infectious from 1-2 days before rash to 4 days after rash. May desquamate in second week.	Prodrome fever, conjunctivitis, cough, Koplik spots (white spots on buccal mucosa). Associated with otitis media, pneumonia, encephalitis, and sub-sclerosing pan-encephalitis	Serology – IgM usually detectable 1-2 days after rash, IF, culture, PCR on nasopharyngeal aspirate (NPA) Consider vitamin A in young children or malnourished patients. Exclude from school. Notifiable disease.

Table 11.1 Skin Infections					
RASH	DIAGNOSIS	GEOGRAPHY AND RISK FACTORS	RASH/LESION DISTRIBUTION AND CHARACTERISTICS	ASSOCIATED FINDINGS	INVESTIGATIONS AND MANAGEMENT
NON-PRURITIC □ HYPOPIGMENTED LESIONS	Leprosy http://www.dermnetnz.org/bacterial/leprosy.html	Asia (Indonesia, Nepal, Sri Lanka, Bangladesh), South America, Pacific, Africa. ²²¹ 8 cases notified in Australia in 2011. ²²²	Prolonged incubation (usually 3-7 years, up to 20 years). Lesions may be raised, flat or nodular; erythematous or hypo-pigmented and can occur anywhere on the skin. Consider leprosy in any hypoaesthetic/anaesthetic rash; altered sensation may precede skin changes. Lumps /swelling may occur on earlobes and/or face.	Thickened, tender peripheral nerves and/or atrophied hand muscles. Keratitis (ophthalmology assessment), nasal ulcers, lymphadenopathy.	Specialist review. Notifiable disease.
	Malassezia infections Pityriasis versicolour http://dermnetnz.org/fungal/malassezia.html	Worldwide	Very common yeast infection of the skin causing flaky discoloured patches on chest and back often associated with hypo or hyperpigmentation. Sometimes scaly and brown but then resolve through to a non-scaly and white stage. Usually asymptomatic but can be mildly itchy.	Not contagious but can affect more than one member of the family.	Usually clinical diagnosis but can be diagnosed using Wood lamp or microscopy with potassium hydroxide. Treatment usually with topical antifungal agents though occasionally oral antifungals are used.
	Other		Onchocerciasis – see above.		
NON-PRURITIC/ PAINLESS* NODULES	Tertiary syphilis http://www.dermnetnz.org/bacterial/syphilis.html	As above.	Granulomatous, nodular lesions 'gummas', ulceration may occur.	Neuro/cardiovascular complications.	Specialist review. See STI chapter 10 Notifiable disease.
	Visceral leishmaniasis	90% of cases occur in India, Bangladesh, Nepal, Sudan and Brazil.	Local, non-ulcerating nodule at site of sand-fly bite. Later onset of skin hyperpigmentation and petechiae.	Hepatosplenomegaly and bone marrow involvement with fever, weight loss, pancytopenia.	Specialist review.
	Subcutaneous cysticercosis (<i>Taenia solium</i>) http://www.dermnetnz.org/arthropods/taeniasis.html	World-wide distribution especially where there is pig rearing.	Multiple painless palpable lesions.		Refer to Intestinal parasites chapter 8.
	Sporotrichosis http://www.dermnetnz.org/fungal/sporotrichosis.html	Farmers, gardeners, agricultural workers.	Red, pink or purple nodule which gradually increases in size and ulcerates, nodules may appear along lymphatic channels. Lesions may be present for years.	Rare pulmonary involvement, arthritis, disseminated disease may occur with immunosuppression.	Specialist review.
	Onchocerciasis	See above.			
	Leprosy	See above.			
	Tuberculosis	See below.			

Table 11.1 Skin Infections					
RASH	DIAGNOSIS	GEOGRAPHY AND RISK FACTORS	RASH/LESION DISTRIBUTION AND CHARACTERISTICS	ASSOCIATED FINDINGS	INVESTIGATIONS AND MANAGEMENT
PAINFUL ULCERATION	Cutaneous amoebiasis http://www.dermnetnz.org/arthropods/amoebiasis.html		Deep seated swelling which ruptures and ulcerates with necrotic base and indurated edges. Typically exude blood and pus.	Scarring and deformity.	Specialist review.
PAINLESS* ULCERATION	Primary syphilis* http://www.dermnetnz.org/bacterial/syphilis.html	As above.	Painless chancre that heals spontaneously in 4-8 weeks; Secondary infection may cause pain.	Local lymphadenopathy.	Specialist review. EIA, not possible to culture, dark field microscopy or PCR of chancre. See STI chapter 10. Notifiable disease.
	Cutaneous leishmaniasis http://www.dermnetnz.org/arthropods/leishmaniasis.html http://www.cdc.gov/parasites/leishmaniasis/index.html	Mediterranean, Middle East (including Syria), Africa, Central Asia, India, Central/S America. Local cases in migrants from (Afghanistan, Pakistan, E/ Sub-Saharan Africa. ^{223,224} Sand-fly transmission.	'Cutaneous leishmaniasis' - Painless plaques, papules or ulcerations 3-6 cm occurring 2-12 weeks after bite on exposed areas. Typically well demarcated, raised and indurated margins +/-satellite lesions, may become chronic or disseminate. 'Mucocutaneous leishmaniasis' - nose and mouth (+/-skin) leading to ulceration and sepsis.		Specialist review. Biopsy.
	Cutaneous tuberculosis http://www.dermnetnz.org/bacterial/tuberculosis.html	Rare even in countries with high incidence (India, China).	Ulceration may occur at primary inoculation site with granular base. Extension of infection from underlying tissues can rarely cause firm nodules which eventually ulcerate ('Scrofuloderma').	Primary infection (lungs, other)	Biopsy for AFB and mycobacterial PCR. Refer to TB chapter 1. Notifiable disease.
	Mycobacteria ulcerans (Buruli ulcer) and other atypical Mycobacterial infections http://www.dermnetnz.org/bacterial/atypical-mycobacteria.html	Africa, South America and Western Pacific Regions.	Painless dermal papule progressing to a nodule on arms or legs which gradually ulcerates with undermined edges revealing whitish-yellow base.	Scarring and deformity.	Mycobacterium ulcerans PCR, histopathology for AFB. Specialist review. Notifiable disease.
LYMPHOEDEMA/ LYMPHANGITIS	Lymphatic filariasis http://www.dermnetnz.org/arthropods/filariasis.html	Tropical, subtropical countries especially SE Asia, Indian subcontinent, Sub-Saharan Africa, Pacific islands, Latin America & Caribbean.	Acute lymphangitis, oedema with subsequent lymphedema. Inflammation spreads peripherally from lymph nodes (compared to bacterial lymphadenitis which spreads centrally).	May be asymptomatic or associated with acute and/or chronic manifestations including fever, orchitis, epididymitis. Chronic lymphoedema. Tropical pulmonary eosinophilia.	Eosinophilia - may exceed 3000/microL. Specialist review- consideration of co-infection (e.g. with onchocerciasis/loiasis) is important.

Singh, K, Dunn, R, Singleton, G & Paxton, G 2016, 'Skin infections', in NJ Chaves, G Paxton, BA Biggs, A Thambiran, M Smith, J Williams, J Gardiner & S Davis (eds), Recommendations for comprehensive post-arrival health assessment for people from refugee-like backgrounds, 2nd edn, Australian Society for Infectious Diseases, Surry Hills, NSW, pp. 89-97.