DIAGNOSIS OF ACUTE RHEUMATIC FEVER
Quick Reference Guide for Health Professionals

This quick reference guide is derived from ‘National Heart Foundation of Australia (NHFA) and the Cardiac Society of Australia and New Zealand (CSANZ) Diagnosis and management of acute rheumatic fever and rheumatic heart disease in Australia — an evidence-based review. 2006’.  

What is acute rheumatic fever?
Acute rheumatic fever (ARF) is an auto-immune response to bacterial infection with group A streptococcus (GAS). People with ARF are often in great pain and require hospitalisation. After the acute episode, rheumatic heart disease (RHD) — damage to the heart valves — may remain. People who have had ARF previously are much more likely than the wider community to have subsequent episodes. Recurrences of ARF are likely to cause further valve damage, leading to steady worsening of RHD.

Who gets acute rheumatic fever?
Although ARF is relatively rare in industrialised countries, it is a significant cause of disease among Aboriginal and Torres Strait Islander peoples. Incidence of RHD is also high among these populations, with significant rates of procedures and death among young adults.

Problems with diagnosis and management
Several factors contribute to inadequate diagnosis and management of ARF and RHD in Australia:
• although strategies for preventing RHD are proven, simple, cheap and cost-effective, they are not adequately implemented in populations at highest risk of the disease;
• because ARF is rare in most metropolitan centres, the majority of clinicians will have seen very few, if any, cases of ARF;
• there is variability in the management of these diseases, with lack of up-to-date training and experience in the management of ARF and RHD occasionally resulting in inappropriate management; and
• access to health care services by population groups experiencing the highest rates of ARF and RHD is limited.

INVESTIGATIONS IN SUSPECTED ACUTE RHEUMATIC FEVER
• All patients with suspected or confirmed ARF should undergo echocardiography to confirm or refute the diagnosis of rheumatic carditis.
• Other investigations are listed below.

RECOMMENDED FOR ALL CASES
• White blood cell count
• Erythrocyte sedimentation rate
• C-reactive protein
• Blood cultures if febrile
• Electrocardiogram (repeat in 2 weeks, then 2 months if prolonged P-R interval or other rhythm abnormality)
• Chest x-ray if clinical or echocardiographic evidence of carditis
• Echocardiogram (consider repeating after 1 month if negative)
• Throat swab (preferably before giving antibiotics) — culture for group A streptococcus
• Anti-streptococcal serology: both anti-streptolysin O and anti-DNase B titres, if available (repeat 10–14 days later if first test not confirmatory)

TESTS FOR ALTERNATIVE DIAGNOSES, DEPENDING ON CLINICAL FEATURES
• Repeated blood cultures if possible endocarditis
• Joint aspirate (microscopy and culture) for possible septic arthritis
• Copper, ceruloplasmin, anti-nuclear antibody, drug screen for choreiform movements
• Serology and auto-immune markers for arboviral, autoimmune or reactive arthritis

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FURTHER INFORMATION
The full evidence-based review from which this quick reference guide is derived provides detailed information on the diagnosis and management of ARF, secondary prevention and RHD control programs, and diagnosis and management of RHD.

Other quick reference guides are:
• Management of Acute Rheumatic Fever
• Secondary Prevention of Acute Rheumatic Fever
• Rheumatic Heart Disease Control Programs
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These publications are available from the National Heart Foundation of Australia through:
Heartline 1300 36 27 87 or heartline@heartfoundation.com.au
Heartsite www.heartfoundation.com.au

IDENTIFYING HIGH-RISK GROUPS
• High-risk groups are those living in communities with high rates of ARF (incidence >30 per 100,000 per year in 5–14-year-olds) or RHD (all-age prevalence >2 per 1,000).
• Aboriginal and Torres Strait Islander Australians living in rural or remote settings are known to be at high risk.
• Data are not available for other populations, but Aboriginal and Torres Strait Islander Australians living in urban settings and potentially immigrants from developing countries may also be at high risk.
• ARF is predominantly a disease of children aged 5–14 years, although people can have recurrent episodes well into their forties.

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Heart Foundation
Accurate diagnosis of ARF is important, as:
- over-diagnosis will result in the individual receiving treatment unnecessarily; and
- under-diagnosis may lead to further attacks of ARF, cardiac damage and premature death.

Currently, there is no diagnostic laboratory test for ARF, so diagnosis remains a clinical decision based on the identification of major and minor manifestations of the disease. The table below outlines diagnostic criteria for high- and low-risk populations in Australia.

### 2005 Australian Guidelines for the Diagnosis of ARF

#### High-Risk Groups

<table>
<thead>
<tr>
<th>Initial episode of ARF</th>
<th>Recurrent attack of ARF with known past ARF or RHD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 major or 1 major and 2 minor manifestations plus evidence of a preceding GAS infection¹</td>
<td>2 major or 1 major and 2 minor or 3 minor manifestations plus evidence of a preceding GAS infection¹</td>
</tr>
</tbody>
</table>

#### Major Manifestations

| Carditis (including subclinical evidence of rheumatic valve disease on echocardiogram) | Carditis (excluding subclinical evidence of rheumatic valve disease on echocardiogram) |
| Polya rthritis, aspecific mono-arthritis or polyarthralgia¹ | Polyarthralgia² |
| Horde¹ | Chorea² |
| Erythema marginatum³ | Erythema marginatum³ |

#### Minor Manifestations

<table>
<thead>
<tr>
<th>Fever⁴</th>
<th>ESR ≥30mm/hr or CRP ≥30mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Polyarthralgia or aspecific mono-arthritis¹</td>
</tr>
<tr>
<td></td>
<td>ESR ≥30mm/hr or CRP ≥30mg/L</td>
</tr>
<tr>
<td></td>
<td>Prolonged P-R interval on ECG⁵</td>
</tr>
</tbody>
</table>

Notes:
- All categories assume that other more likely diagnoses have been excluded (see Differential diagnostic table, next page).
- CRP=C-reactive protein; ESR=erythrocyte sedimentation rate; GAS=group A streptococcus
- Prolonged P-R interval on ECG must be considered if evidence of rheumatic carditis, additional minor manifestation in the same person.
- Chorea does not require other manifestations of evidence of preceding GAS infection, provided other causes of chorea are excluded.
- Care should be taken not to label other rashes, particularly non-specific viral exanthemas, as erythema marginatum.
- Oral, tympanic or rectal temperature ≥38°C on admission or documented during the current illness.

### Evidence of Preceding Group A Streptococcal Infection

- All suspected cases of ARF (except those with chorea or low-grade sub-acute carditis) should have elevated serum streptococcal serology demonstrated.
- If the initial titre is below the upper limit of normal (ULN) for age, repeat testing after 10–14 days.
- In the absence of local data, it is recommended that the ULN values below be used for children.

### Differential Diagnoses of Common Major Presentations of ARF

- Diagnosis of ARF is based on the assumption that other likely diagnoses have been excluded.
- Some post-streptococcal syndromes may be confused with ARF and these diagnoses should rarely, if ever, be made in high-risk populations.

#### Carditis

- Usually presents clinically as an apical holosystolic murmur, with or without a mid-diastolic flow murmur, or an early diastolic murmur at the base of the heart.
- Extremely painful, affecting the large joints — especially the ankles and knees; usually asymmetrical and migratory, but can be additive.
- Usually responds within 3 days of starting NSAID therapy.

#### Polya rthritis

- Involves multiple joints (at least 4) with morning stiffness for at least 30 minutes.
- Most manifestations of ARF are accompanied by fever.
- Usually responds within 3 days of starting NSAID therapy.

#### Erythema marginatum

- Extremely rare as well as difficult to detect in Aboriginal Australians, but highly specific for ARF.
- Occurs as circular patterns of bright pink macules or papules on the trunk and proximal extremities.

### Subcutaneous Nodules

- Rare but highly specific manifestations of ARF, strongly associated with carditis.
- Present as crops of small, round, painless nodules over the elbows, wrists, knees, ankles, Achilles tendon, occiput and posterior spinal processes of the vertebrae.

### Minor Manifestations

- Apasic mono-arthritis or polyarthralgia
- Erythema marginatum
- Carditis
- Polyarthritis
- Chorea
- Prolonged P-R interval

Notes:
- ESR ≥30mm/hr or CRP ≥30mg/L meets this diagnostic criterion.
- If carditis is present as a major manifestation, prolonged P-R interval cannot be considered an additional minor manifestation.

### EVIDENCE OF PRECEDING GROUP A STREPTOCOCCAL INFECTION

#### Acute Post-Streptococcal Glomerulonephritis

- Includes rheumatoid arthritis, juvenile chronic arthritis, inflammatory bowel disease, systemic lupus erythematosus, systemic vasculitis and sarcoidosis, among others.
- Mycoplasma, cytomegalovirus, Epstein-Barr virus, parovirus, hepatitis, rubella, and other gastrointestinal pathogens.
- Possibly including PANDAS (pediatric auto-immune neuropsychiatric disorder associated with streptococcal infection).
- Lyme disease has not been confirmed in Australia or New Zealand.
- Includes oral contraceptives, pregnancy (choria gravidum), hyperthyroidism, hypoparathyroidism.

### MANIFESTATIONS OF ARF

#### Major Manifestations

- Carditis
- Polyarthralgia
- Erythema marginatum
- Subcutaneous nodules

#### Minor Manifestations

- Apasic mono-arthritis or polyarthralgia
- Carditis
- Polyarthritis
- Chorea

### Differential Diagnoses

#### Carditis

- Systemic lupus erythematosus
- Drug intoxication
- Wilson’s disease
- Tic disorder
- Choreaathetoid cerebral palsy
- Encephalitis
- Familial chorea (including Huntington’s)
- Intracranial tumour
- Lyme disease
- Hormonal

#### Polyarthralgia and Fever

- Sepsis arthritis (including gonococcal)
- Connective tissue and other auto-immune disease¹
- Viral arthropathy¹
- Reactive arthropathy¹
- Lyme disease¹
- Sickle-cell anaemia
- Infective endocarditis
- Leukaemia or lymphoma
- Gout and pseudogout

### Notes:
- Includes rheumatoid arthritis, juvenile chronic arthritis, inflammatory bowel disease, systemic lupus erythematosus, systemic vasculitis and sarcoidosis, among others.
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DIAGNOSTIC CRITERIA FOR ARF

Accurate diagnosis of ARF is important, as:
* over-diagnosis will result in the individual receiving treatment unnecessarily; and
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<thead>
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<th>AGE GROUP</th>
<th>UPPER LIMIT OF NORMAL (LUMIL)</th>
</tr>
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<tbody>
<tr>
<td>0-5</td>
<td>120</td>
</tr>
<tr>
<td>6-9</td>
<td>480</td>
</tr>
<tr>
<td>10-14</td>
<td>320</td>
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Notes: ASO=anti-streptolysin; anti-DNase=anti-deoxyribonuclease B

2005 AUSTRALIAN GUIDELINES FOR THE DIAGNOSIS OF ARF

HIGH-RISK GROUPS

- Initial episode of ARF
  - 2 major or 1 major and 2 minor manifestations plus evidence of a preceding GAS infection

- Recurrent attack of ARF with known past ARF or RHD
  - 2 major or 1 major and 2 minor or 3 minor manifestations plus evidence of a preceding GAS infection

Major manifestations

- Carditis (including subclinical evidence of rheumatic valve disease on echocardiogram)
- Polyarthritis, aspecific mono-arthritis or polyarthritis
- Chorea
- Erythema marginatum
- Subcutaneous nodules

Minor manifestations

- Fever
- ESR ≥30mm/hr or CRP ≥30mg/L
- Prolonged P-R interval on ECG

Notes: All categories assume that other more likely diagnoses have been excluded (see Differential diagnostic table, next page).

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MAJOR MANIFESTATIONS

- Carditis (excluding subclinical evidence of rheumatic valve disease on echocardiogram)
- Polyarthritis
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- Subcutaneous nodules

MINOR MANIFESTATIONS

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Notes: CRP=C-reactive protein; ECG=electrocardiogram; ESR=erythrocyte sedimentation rate; NSAID=non-steroidal anti-inflammatory drug

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DIFFERENTIAL DIAGNOSES OF COMMON MAJOR PRESENTATIONS OF ARF

PRESENTATION

CARIADIS

- Sepsis
- Infection (including sepsis)
- Autoimmune disease
- Viral arthropathy
- Reactive arthropathy
- Lytic disease
- Sickle cell disease
- Infective endocarditis
- Infective endocarditis
- Leukaemia or lymphoma
- Gout and pseudogout

- Innocent murmur
- Mitral valve prolapse
- Congential heart disease
- Infective endocarditis
- Hypertrophic cardiomyopathy
- Pericarditis — viral or idiopathic
- Syphilitic endocarditis
- Drug intoxication
- Wilson's disease
- TBC disorder
- Sickle cell disease
- Choreaathetoid cerebral palsy
- Eczephalitis
- Familial chorea (including Huntington's)
- Intracranial tumour
- Lyme disease
- Hirnoma

Notes: Includes rheumatoid arthritis, juvenile chronic arthritis, inflammatory bowel disease, systemic lupus erythematosus, systemic vasculitis and sarcoidosis, among others.

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