



The future of acute rheumatic fever and rheumatic heart disease in Australia

Can we be optimistic?

An 8-year-old Aboriginal girl presents with shortness of breath and severe mitral regurgitation, and requires urgent surgery; a young Torres Strait Islander mother has a disabling stroke related to mitral stenosis; and a middle-aged Aboriginal community leader dies from infective endocarditis associated with a mechanical valve. These are the realities of acute rheumatic fever (ARF) and rheumatic heart disease (RHD) in Australia.

Globally, ARF and RHD cause more than a quarter of a million deaths and substantial disability each year. In Australia, Aboriginal and Torres Strait Islander people bear the greatest burden of disease.¹ While illustrating the challenges that Indigenous Australians face, developments in ARF and RHD provide a focus for further work and grounds for cautious optimism. These include the development of a vaccine to prevent group A streptococcus (GAS) infection, better delivery of secondary antibiotic prophylaxis, and better management of advanced RHD.

The ultimate solution to ARF and RHD is primordial prevention of the social and environmental determinants of GAS infection. During the 20th century, ARF was largely borne by non-Indigenous Australian children in southern parts of Australia. The association between ARF and household crowding, and the dramatic reduction seen elsewhere in Australia, reinforces the need for a multi-faceted response to disadvantage. While this remains the long-term focus, much can be achieved in the short-to-medium term.

Primary prevention of upper respiratory tract GAS infection is such a target. While antibiotic treatment of GAS pharyngitis prevents ARF in individuals, systematic prevention programs in high-risk populations have not resulted in a reduction in ARF.² This may, in part, be related to the lack of symptomatic pharyngitis in over two-thirds of people who present with ARF.¹ The development

of an effective and affordable GAS vaccine is therefore the priority. While development of such a vaccine by Australian and US researchers has promise, clinical trials and licensing are at best 5–10 years away.³

In the meantime, delivery of secondary antibiotic prophylaxis via dedicated register and recall systems to those with a history of ARF or RHD will provide the greatest benefit.⁴ Although the efficacy of regular benzathine penicillin G (BPG) therapy has been shown, the ability to deliver this has been largely disappointing in Australia — only one in five people with a history of ARF or RHD receive 80% or more of the scheduled doses.⁵ Enhancing delivery requires more than addressing the pain of injections.⁶ In Australia, we are working with communities to identify why some sites have greater success than others, and we are about to embark on a community-based trial of a multidimensional intervention to improve delivery rates. While such studies will provide information on delivery of BPG-based secondary prophylaxis, it is also time to think more broadly. Given that secondary antibiotic prophylaxis can be required for 10–30 years, a “technologic” fix based on improved delivery systems — such as an implantable or long-acting form of penicillin — might be more attractive. Given the priority that ARF and RHD hold in Australia and the low-income status of countries where most cases of ARF and RHD occur, Australia is ideally placed to lead the development of such innovations.

In the interim, we will continue to be faced with managing advanced RHD. The choice and timing of surgical and other interventions in RHD is limited by a number of factors. These include lack of evidence regarding the choice and timing of interventions; barriers to access to the range of specialty services required; lack of multidisciplinary care linking urban-based specialist units, local health care providers, and families and communities; limited

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understanding of the barriers to and enablers of successful anticoagulation and follow-up; and lack of long-term follow-up data relating to surgical and other interventions.⁷ Leadership and collaboration with Australian cardiothoracic surgeons and others involved in the management of advanced RHD, and the expansion and enhancement of existing national surveillance systems to incorporate surgical and non-surgical valve intervention outcomes, provide a foundation for improving care for patients with advanced RHD. Given the relatively small numbers of patients, the establishment of a national centre for managing advanced RHD may be required.

In Australia, Aboriginal and Torres Strait Islander people face extensive health challenges without having to also bear the burden of a condition that has been largely eradicated from the non-Indigenous population of Australia. While primordial prevention is key, there are a number of high-impact areas where — with appropriate enthusiasm, collaboration and support — we can make a difference today. The development of a GAS vaccine, improved delivery of secondary antibiotic prophylaxis and more consistent and evidence-based management of advanced RHD will all improve short-term outcomes.

Every death or disability associated with ARF or RHD is a preventable tragedy. Nonetheless, we have reason to be cautiously optimistic regarding the future of ARF and RHD in Australia.

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- 1 RHD Australia. Australian guideline for prevention, diagnosis and management of acute rheumatic fever and rheumatic heart disease. Darwin: RHD Australia, 2012. <http://rhdaustralia.org.au/resources/arf-rhd-guideline> (accessed Jun 2012).
- 2 Lennon D, Stewart J, Farrell E, et al. School-based prevention of acute rheumatic fever: a group randomized trial in New Zealand. *Pediatr Infect Dis J* 2009; 28: 787-794.
- 3 Steer AC, Batzloff MR, Mulholland K, Carapetis JR. Group A streptococcal vaccines: facts versus fantasy. *Curr Opin Infect Dis* 2009; 22: 544-552.
- 4 Brown A, Purton L, Schaeffer G, et al. Central Australian rheumatic heart disease control program: a report to the Commonwealth. *NT Dis Control Bull* 2003; 10:1-8.
- 5 Rémond M, Severin K, Hodder Y, et al. Variability in disease burden and management of rheumatic fever and rheumatic heart disease in two regions of tropical Australia. *Intern Med J* 2012. In press.
- 6 Harrington Z, Thomas DP, Currie BJ, Bulkhanhawuy J. Challenging perceptions of non-compliance with rheumatic fever prophylaxis in a remote Aboriginal community. *Med J Aust* 2006; 184: 514-517.
- 7 Rémond MG, Wheaton GR, Walsh WF, et al. Acute rheumatic fever and rheumatic heart disease — priorities in prevention, diagnosis and management. A report of the CSANZ Indigenous Cardiovascular Health Conference, Alice Springs 2011. *Heart Lung Circ* 2012. In press. □

Stamps of greatness



Alexis Carrel (1873–1944)

CARREL was born in Sainte-Foy-les-Lyon, France, on 28 June 1873. He graduated as a physician from the University of Lyon in 1900.

In 1905 he emigrated to the United States to become an instructor in physiology at the University of Chicago, Illinois.

In 1909 he became an associate member in surgery at the Rockefeller Institute in New York, and was promoted to full member in 1912.

Carrel revolutionised surgery of the vascular system and made great advances in physiology and physiological surgery, paving the way for transplant surgery as we know it today.

In 1902 he published his first paper on vascular anastomosis and visceral transplantation, in which he showed that perfect end-to-end connection of blood vessels can be achieved by a triple-threaded suture in the opposing ends which, when drawn lightly, converts the round lumen of the vessel into an equilateral triangle. This procedure secures close apposition of the edges, without leakage, and preserves the continuity of the lumen, avoiding thrombosis. Before Carrel's time a wounded artery was treated only by ligation in continuity.

From end-to-end anastomosis of arteries, Carrel advanced by means of specially invented needles and rigid asepsis to the substitution of a piece of blood vessel, and then to the transplantation of whole organs in animals. He successfully transplanted a kidney, with its vascular supply, from one cat to another, with secretion of urine beginning before the end of the operation.

In 1911 he advanced the work of RG Harrison on extravalvular cultivation of nerve cells, which culminated in 1912 in his remarkable experiment of keeping the excised viscera of an animal alive and

functioning physiologically in vitro. He also succeeded in keeping cancer cells alive and growing in vitro, ie, in a glass bottle.

For these experiments he received the Nobel Prize in Physiology or Medicine in 1912.

During World War I he devised the Carrel–Dakin treatment for managing infected and gas-gangrenous wounds with wet compresses or continuous irrigation, using Dakin's solution.

In 1930 he received the Nordhoff–Jung Prize for cancer research.

Carrel died in Paris on 5 November 1944. He was honoured postally as a Nobel laureate by Sweden in 1972 in its series on Nobel Prize winners.

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Antonius Mathijsen (1805–1878)

BORN in Budel, a village in the Brabant region of the Netherlands, on 4 November 1805, Antonius Mathijsen studied medicine at hospitals in Brussels and Maastricht, and then at the military medical school in Utrecht. After becoming an army surgeon he was particularly interested in orthopaedics and is best remembered for his introduction of plaster of Paris casts and bandages in 1851, which are the mainstay of fracture treatment still.

Mathijsen retired from the military in 1868 to the region of his hometown, where he was known by locals as "The Major". He died on 15 June 1878, in Hamont, Belgium (just across the border from Budel), and was postally honoured by the Netherlands in 1946.

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