PREVENTING ACUTE RHEUMATIC FEVER BY USING THE "DAYS AT RISK" CONCEPT

Author: Keith N. Edwards, Rheumatic Heart Disease Control Program, Centre for Disease Control, Darwin, Northern Territory, Australia

INTRODUCTION

- Acute Rheumatic Fever (ARF) affects 3% of Aboriginal people living in the Northern Territory of Australia. This recurrent autoimmune reaction to Group A Streptococcal infection causes Rheumatic Heart Disease (RHD) and early death in those affected.

- RHD can be prevented by preventing streptococcal infection and recurrence of ARF with an intramuscular injection of Benzathine Penicillin every 28 days (Secondary Prophylaxis).

- Late delivery of these injections results in breakthrough Streptococcal infection, a further episode of ARF and damage to heart valves (RHD).

- Extreme remoteness of communities and clinics with high turnover of clinic staff is a major reason for injections being given late.
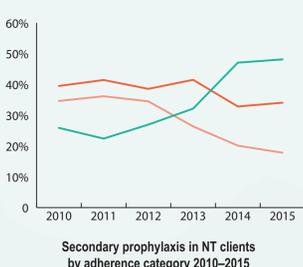

OBJECTIVE

To reduce the prevalence of RHD by preventing recurrences of ARF by improving the timely delivery of Secondary Prophylaxis (SP).

METHODS

- Systems analysis to determine reasons for late delivery of SP.

- Focus discussion with health staff and clients during paediatric outreach clinics in remote communities.

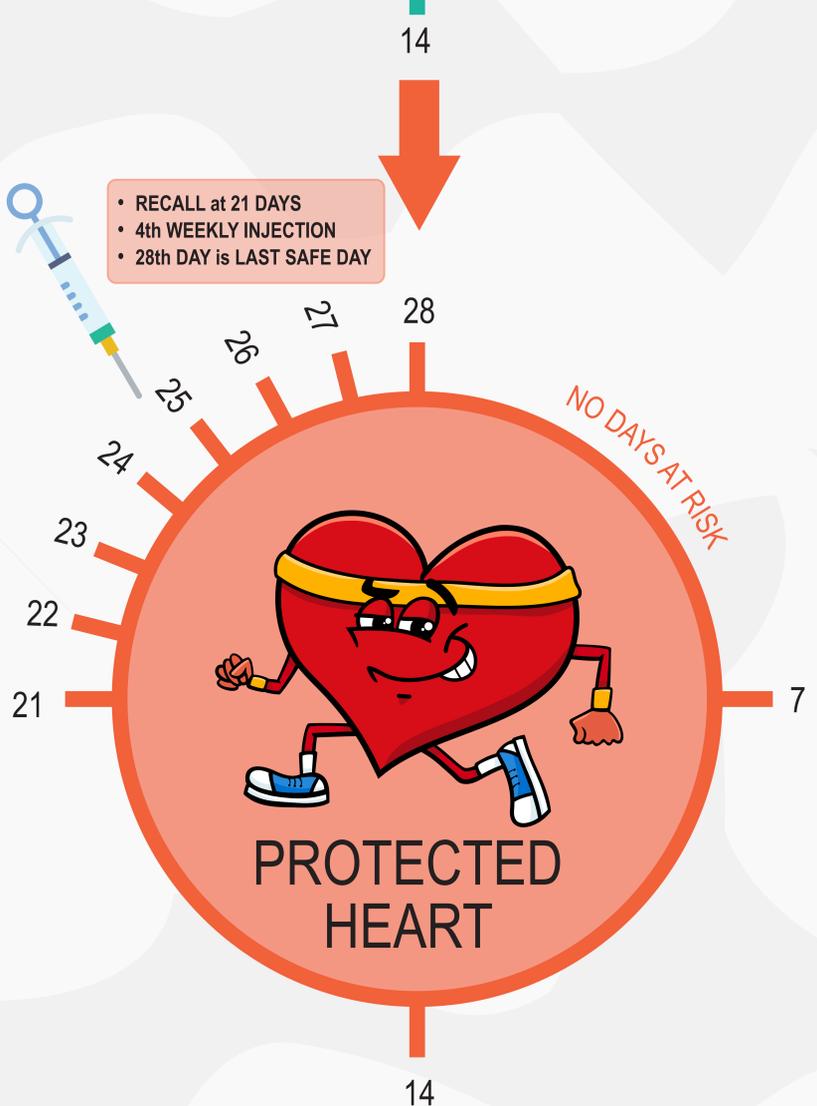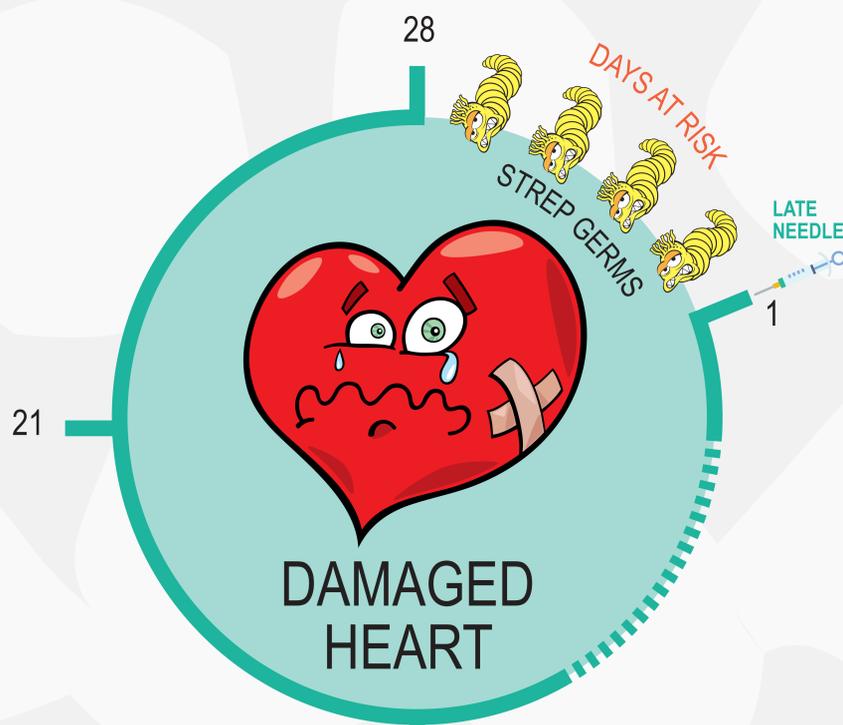- Analysis of RHD Control Program Register Data

RESULTS

- Lack of realization in both clinic staff and clients of the consequence of late SP.

- Recall at 28 days leads to late SP as it often takes a number of days to find client.

- Recurrence most common in teenagers.

- "Days at Risk" concept defined.

- Recall changed to 21 days and 4 weekly SP changed to 4th weekly SP with the 28th day being the last safe day for injection to be given.

- Improved rates of SP. Less days at Risk

Secondary prophylaxis in NT clients by adherence category 2010–2015

Prophylaxis adherence in Top End by age group from 1 Jan 2000 to 31 Dec 2011

CONCLUSIONS

- Systems analysis is an important tool to refine routine processes.

- Using terminology which labels the problem in a self--explanatory way leads to improved understanding and drives behaviour change both in health staff and clients.

28 DAY CYCLE SP

DAYS AT RISK
STREP GERMS
LATE NEEDLE

DAMAGED HEART

- **RECALL at 21 DAYS**
- **4th WEEKLY INJECTION**
- **28th DAY is LAST SAFE DAY**

NO DAYS AT RISK

PROTECTED HEART

REFERENCE   National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand. Australian guideline for prevention, diagnosis and management of acute rheumatic fever and rheumatic heart disease (2nd edition). 2012

NORTHERN TERRITORY GOVERNMENT

Centre for Disease Control Northern Territory

Australian Government

Days at risk for acute rheumatic fever recurrence
Keith Edwards, CDC, Darwin

Abstract

The Northern Territory (NT) has very high rates of acute rheumatic fever (ARF) and its sequelae rheumatic heart disease (RHD).

The NT RHD Control Program works to prevent recurrences of ARF by promoting individuals at risk to have their injections of long-acting Benzathine penicillin (secondary prophylaxis) at 4 weekly intervals in a timely manner. On average 30% of all NT cases of ARF are recurrences. A recent audit of 5 to 19 year olds at risk of ARF showed that on any 1 day 20% to 67% were not protected and 'at risk' of recurrence because of delayed secondary prophylaxis.

To improve timely prophylaxis 3 clear messages are promoted:

1. *to avoid any days at risk*
2. *to have the needle early in the 4th week and*
3. *that the 28th day is the last day to safely have the needle.*

Acute Rheumatic Fever (ARF) is a disease of poverty which can follow episodes of Group A Streptococcal (GAS) infections either in the throat or in skin sores. Certain individuals react abnormally and produce antibodies and cellular inflammation which not only attack the bacteria, but can also affect the joints (arthritis), the heart (carditis) and sometimes the brain (chorea). Children from the age of 5 years are most likely affected and the peak incidence occurs from 10 to 23 years of age (Figure 1).

The joints are not permanently damaged but the heart often is, particularly the heart valves, leading to significant valve damage which may require surgery and can lead to premature death. The Northern Territory (NT) has one of the highest rates of ARF and Rheumatic Heart Disease (RHD) in the world. The NT RHD Control Program maintains a clinical register of patients who have had ARF in order to facilitate timely treatment and follow-up and thereby optimise the likelihood of long term survival. The main program goal is to prevent recurrence of ARF in an individual who has had a first episode. This can be achieved by protecting patients from streptococcal infection by the injection of long-acting Benzathine penicillin (LA Bicillin) at 4 weekly intervals. This is called secondary prophylaxis. Figure 1 shows rates of adherence to secondary prophylaxis by age group and it can be seen that adherence rates are lowest in the young adults where the incidence of ARF is highest.

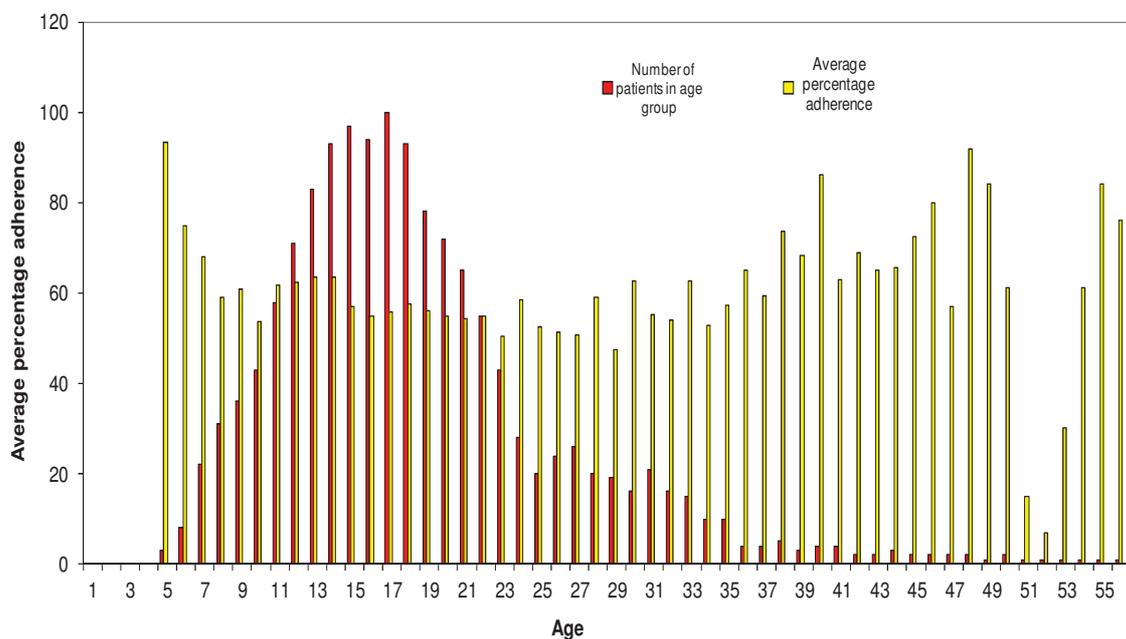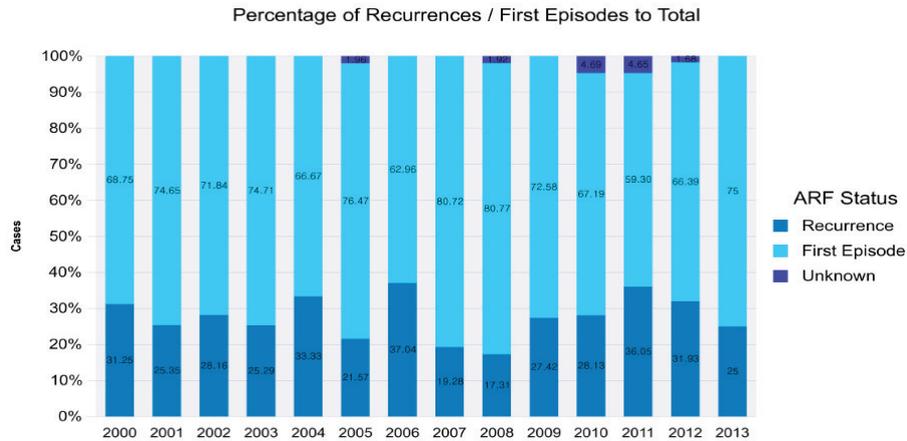**Figure 1.Incidence of ARF and percentage adherence to secondary prophylaxis by age**

Figure 2. ARF recurrent episodes as percentage of total annual ARF episodes

Percentage of Recurrences / First Episodes to Total

Timely provision of secondary prophylaxis is the best way to prevent recurrence of ARF and damage to heart valves (RHD). The interval between injections of LA Bicillin is critical for this treatment to be successful. Too long, and the patient becomes unprotected and risks a recurrence of ARF, too short and the patient may be less keen to receive this painful preventative treatment and the increased workload may overburden the health clinic. Figure 2 shows the incidence of ARF each year and the percentage of cases which are recurrent and more likely to cause significant heart damage. On average, about 30% of ARF cases are recurrences over the 13 year period shown. These cases of ARF recurrence occur because of late or missed administration of LA Bicillin.

Initially, in Australia, secondary prophylaxis for ARF was given monthly, as this was easiest to achieve in a practical sense and there was historical evidence that a monthly regime could successfully prevent recurrence in other populations, even though, pharmacological studies show that penicillin levels in the blood drop to very low levels after the third week. With the growing realisation that recurrences were occurring at an unacceptably high rate, the decision was made by the NT RHD Control Program steering committee to change to a 4 weekly regimen. Even so, in the NT, the majority of ARF/RHD patients receive less than 80% of their LA Bicillin injections in 1 year (Figure 1) which means the interval between their injections is often well over 4 weeks.

Figure 3. Days at risk prior to recurrence of ARF for 21 clients aged 5-19 years
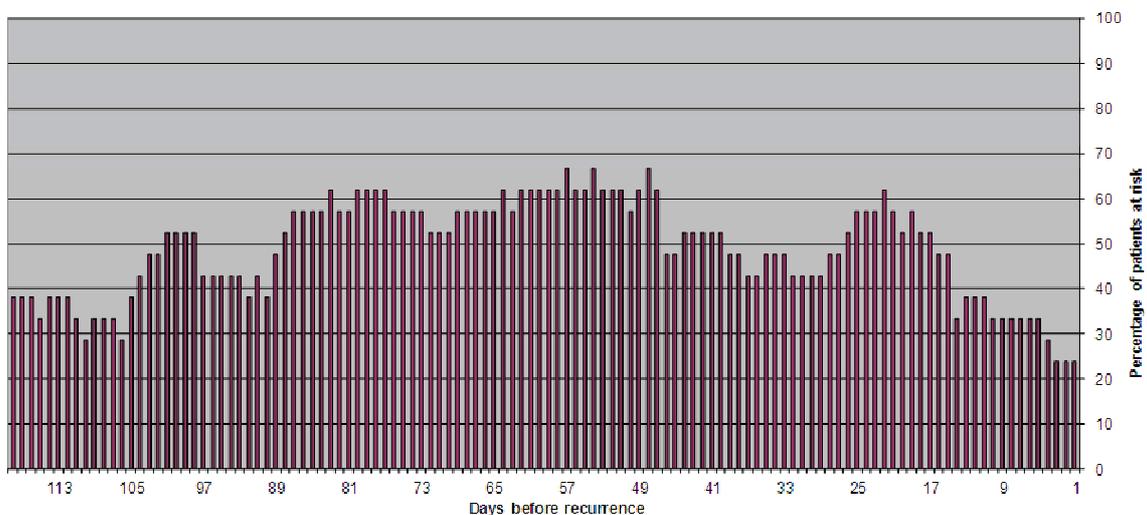
As stated, the recurrence rate is unacceptably high. Efforts to increase the proportion of patients who receive more than 80% of their injections have included:

- continual staff and client education,
- regular contact with health clinics with feedback on their performance in terms of delivering secondary prophylaxis,
- performance auditing exercises to selected clinics using the ABCD approach.

These strategies have only had small effects, though a recent analysis of the ARF/RHD register revealed a 10% reduction in recurrence each year during the 10 year period prior to 2011.[1]

A recent audit of the ARF/RHD register looked specifically at how protected 21 5-19 year old patients were prior to their recurrence (Figure 3). This graph shows the proportion (%) of 5 - 19 year old patients who were not protected each day for the 3 month period prior to their recurrence. This reveals that each day between 20% and 67% of patients were not protected or were 'at risk' and that the peak period for risk was 49 to 58 days prior to recurrence. This figure clearly shows the extent of the risk of recurrence for these patients. This analysis led to the 'days at risk' concept and it was felt that this had potential to improve levels of secondary prophylaxis by:

- better informing health staff of the need to avoid 'days at risk' by giving the LA Bicillin on or before the 28th day, and
- better informing patients of their 'potential days at risk' and how to avoid a recurrence.

Currently, many patients wait to be recalled for their 'needle' by the clinic. As the recall is set at 28 days, by the time the patient is seen, days at risk have occurred. The NT RHD Control Program is therefore promoting 3 clear messages.

- Avoid any days at risk.
- Have your needle in the 4th week, early not late.
- The 28th day is the last day you can safely have your needle.

This will result in some clients receiving more than 13 injections in the year but if implemented well has the potential to reduce recurrences dramatically. This is shown schematically in Figure 4.

Figure 4. Flow chart for LA Bicillin administration for patients on secondary prophylaxis
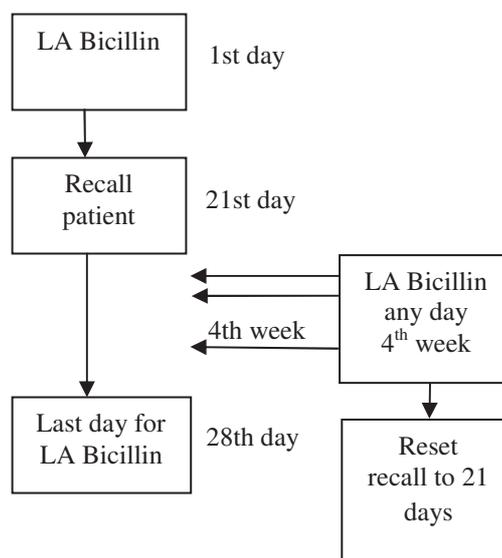
The NT RHD Control Program is currently looking at ways to monitor days at risk for individual patients and also by clinic as this is likely to be a better indicator of successful protection than number of injections in a year. It is proposed to modify the register to automatically calculate this information and also to automatically reset the recall to 21 days after an ARF/RHD LA Bicillin has been given.

Reference

1. Joanna Lawrence – Personal Communication.
2. RHD Australia (ARF/RHD writing group), National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand. *Australian guideline for prevention, diagnosis and management of acute rhematic fever and rheumatic heart disease (2nd edition)*. 2012.

Acknowledgement

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