

## Scientific summary (Scientific report)

### What were the main scientific objectives of the grant?

Key Research Question: What are the epidemiology and longitudinal population-based outcomes with respect to gout in a Western Australian population based sample?

Aims: To utilize the WARDER research resource - a derivative of the WADLS – to

1. Describe the overall trends in comorbidities (hospital admission for acute gout/ hospital admissions complicated by acute gout/ cardiovascular events/ renal events/ fracture), mortality and use of hospital resources (ED visits) for patients with gout in WA over the period 1980-2012.
  2. Compare comorbid conditions associated/ mortality / use of hospital resources (ED visits) of gout patients in WA in stratified for age, gender, ethnicity, remoteness and equity (Medicare compared to Private patients).
  3. Investigate the relationship between acute gout and cardiovascular outcomes in WA
- Hypotheses:

### What were the main scientific achievements of the grant?

*Aim 1: We demonstrated that people admitted with acute gout to hospitals in WA, have an increased risk of death over an average of a 10 year follow-up compared to hospital controls, or the background population.*

30,518 patients with gout and 89,519 matched controls who had a hospital-level contact(s) in Western Australia between 1<sup>st</sup> Jan 1980 and 31<sup>st</sup> Dec 2014 were included. Demographic and clinical characteristics were obtained from the Hospital Morbidity Data Collection; and, mortality data were obtained from the WA death registry.

#### **All-cause mortality compared to hospital-based controls**

Gout patient's recorded 21,514(70.5%) deaths compared to controls 34,282 (38.30%). Compared to hospital-based controls, patients with gout had a higher unadjusted and adjusted risk of all-cause mortality during follow-up (HR 2.17, 95% CI 2.13, 2.21; P<0.001 and aHR 1.30, 95% CI 1.27, 1.32; P<0.001, respectively) (Table 2)

#### **Cause-specific mortality rates compared to controls**

Adjusting for age, sex, Indigenous status, year of time zero, smoking, obesity and forced entry of one comorbidities, people with gout had an increased risk of mortality related to infection, cardiovascular disease, diseases of blood, endocrine, metabolic and nutritional disorders, malignancy, diseases of the gastrointestinal system, diseases of the skin, and musculoskeletal disease (excluding gout) and a decreased risk of mortality due to mental and behavioural disorders and disorders of the nervous system.

#### **Mortality relative to the general population of the Western Australia**

Gout patients requiring hospital level care had an increased likelihood of mortality compared to the general population for up to ten years post incident gout hospitalisation. This increase was most pronounced in the first year (SMR 3.58, 95%CI 3.48, 3.69; p<0.001), was present to a lesser extent in the second year (SMR 1.94, 95%CI 1.89, 1.98; P<0.001) and was sustained for fifteen years (Table 4). However, gout patients had a late reduction (>15 years since index hospital contact) in SMR compared to the general population. Patients with a diagnosis of gout, who survive 15 years from diagnosis, lived longer than the estimated resident

population. The SMR of the hospital-based controls was similar to the general population over 35 years of follow-up.

*Aim 2: We demonstrated people with gout, are highly likely to be readmitted to hospital, or attend ED in the 5 years after admission, and this is associated with high costs. Many of these health care contacts are preventable.*

The cohort included 4,379 individuals, of which 3,379 (77.2%) were male and 298 (6.8%) were Aboriginal, with an average age of 65.2 years (SD 14.7) at their initial gout hospitalisation. In the following five years, there was 22,222 ED attendances with a median cost of \$1,826 per patient (IQR: \$433 - \$4,414), and 58,920 hospital admissions, with a median cost of \$25,009 per patient (IQR: \$6,844 - \$60,535). A total of 4,059 (18.3%) ED attendances and 3,834 (6.5%) hospital admissions were deemed potentially preventable. Gout was not a primary driver of ED or hospital events, with 341 (1.5%) ED attendances and 620 (1.1%) hospital admissions coded with a primary diagnosis of gout. Aboriginality was associated with an increased number of both ED attendances and hospital admissions; risk ratio (RR) 3.47 (95% CI: 2.99, 4.03) and 1.51 (95%CI: 1.25, 1.82) respectively. Increased socio-economic status was associated with a reduction in ED attendances, however, this was not reflected in hospital admissions (highest quintile RR 0.27 (95%CI 0.23, 0.33) and 1.12 (95%: 0.89, 1.41) respectively. Smoking was also associated with increase in ED attendances and hospital admissions (including PPE) (RR: 1.79, 95%:1.64, 1.95 and RR: 1.53, 95%: 1.38, 1.70 respectively).

*Aim 3. We demonstrated that people with gout are more likely to have a major adverse cardiovascular event in the 30 days after admission with acute gout then the year before or after the admissions, suggesting that acute inflammation may be associated with poor CV outcomes.*

We undertook a self-controlled case series analysis on 854 people admitted to hospital in WA with acute gout had a major cardiovascular event (MI, UA, stroke, HF; or receipt of PCI/CABG; or death due to CHD, stroke, HF) in the 12 months either side of the 1st admission to hospital with acute gout based on a 10 year look back. People admitted to hospital with acute gout have a 2.49 times increased risk of MACE outcome during the 30 days after the admissions, than the 365 days prior to the admissions, or days 31 to 365 after the admission.

**What problems, if any, did you encounter in achieving the project's objectives, and how did you address them?**

N/A

Have you disseminated, or plan to disseminate, the results of this research? Please tell us about:

We have one abstracts accepted as a poster presentation at ELAR 2021. Other papers are in draft form, to be submitted in 2021.