# 2016/2017 Summer Studentship Project Application Form

Send to: Research Office, University of Otago Christchurch, PO Box 4345, Christchurch, by 5pm on **4 July 2016**

| **Supervisor Information (First named supervisor will be the contact):** | |
|---|---|
| First Supervisor's Name and Title: Dr Hamish Jamieson | |
| Department - UOC &/or CDHB (if applicable): UOC and CDHB | |
| First Supervisors Phone: 021 811 070 | First Supervisors Email: |
| First Supervisors Mailing Address: Hamish.jamieson@otago.ac.nz | |
| Co-Supervisors Name and Title(s): Dr John Thwaites, Prof Tim Anderson, Prof John Dalrymple-Alford | |

| **Research Category (Choose one category only – to be used for judging the students' presentations):** | | |
|---|---|---|
| **Clinical** | **Laboratory** | **Community COMMUNITY** |

**Project Title (20 words MAXIMUM):**

Predictors of hip fractures in Parkinson's Disease

**Project Description:**

Introduction: Hip fracture in older people significantly impacts on morbidity and mortality. Many patients have impairment of mobility and function 12 months post-surgery following hip fracture[1 2 3] .
The risk of long term residential care following hip fracture is increased[4]. Hip fractures are associated with a reduction in quality of life[5 6 7]. Mortality following hip fracture is over 20% at 12 months[8 9 10]. The cost of hip fractures to society is high. A study of hip fracture in New Zealand, found 3,803 people were admitted to New Zealand hospitals in 2007 with an estimated direct cost of NZD$105 million (2007 dollar values), with over 5000 hip fractures expected by 2020 in New Zealand [5].

Identifying and understanding the risk factors for hip fracture is critical to developing strategies for primary prevention to reduce the risk of subsequent fracture. While classical risk factors are known the power of the interRAI data allows multiple risk factors to be assessed and compared such as BMI, recent falls and walking speed. This pilot study will utilize the New Zealand National Health identifier number (NHI)-linkage of interRAI data to allow those with hip farctures after Parkinson's Disease to be identified.

Aim:

To pursue this pilot study there are two aims

AIM ONE: To determine the rate of hip fracture for people with Parkinson's Disease in New Zealand

AIM TWO: To identify the predictors of hip fractures for those with Parkinson's Disease

Possible impact (in lay terms): Routinely collected data at initial assessment may help identify those patients at high risk for hip fracture who might benefit from further investigation and preventive measures. The development of a clinical risk scale may

assist with a more targeted approach for preventing hip fracture compared with current models. .

Method: Ethics approval has been obtained. This study will examine the results of a pre-existing database. All information is stored electronically and is NHI linked, using encryption for data security.

*AIM ONE: To determine the fracture rates for those with Parkinson's Disease after interRAI assessments*

2. The interRAI assessments from 80,000 successive national interRAI assessments between 2012 and 2015 will be obtained. Preliminary analysis shows that 3,200 people have Parkinson's Disease

3. Medium-term outcomes will be sourced using the NHI-linkage of the data using the National Minimum dataset, and births, deaths and marriages data for information on hospitalisations, mortality and requirement for residential care.

Outcomes of femoral fracture will be established for patients with Parkinson's disease using ICD codes. Results will be stratified by age, sex and ethnicity.

*AIM TWO: To identify risk factors for fractures for those with Parkinson's disease*

Many factors can increase the risk of hip fractures such as age, sex and falls. Using interRAI data we will rate the impact these variables have on fractures as well as multiple other variables such as recent falls, depression and incontience. We will use statistical methods appropriate for very large categorical datasets. Two of these methods are random forests (an ensemble method for describing relationships in data and classifying groups) and boosting (a machine learning classifying method).

In random forest analysis, a large number of decision trees are built (to create a forest). The method uses averaging over the multiple trees and reduces variance and bias. At each split, in the decision tree, a random sample of predictors is chosen. The tree at that split can only use one of the randomly-chosen variables. The method would be used to generate a hierarchal list of the contributing factors and would rank the 236 variables on the degree of influence (if any) they have on the outcomes. Boosting is an approach for improving the classifications from a decision tree. This method creates a decision tree for the original dataset, and then uses the information from that tree to modify the original dataset. Subsequent trees then fit on modified versions of the original dataset, so the trees grow sequentially. These methods would be used to produce plots where the 236 variables are ranked by their relative influence on fracture rates.