InterRAI Data Review

Report 2015/16

South Island Alliance
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Christchurch 8053, New Zealand

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Contents

Background

An opportunity for the South Island Alliance and University of Canterbury to collaborate has been realised with the completion of these brief data analysis reviews using the interRAI data.

The analysis has been undertaken by Summer Students with strong experience in statistics. The students completed a minimum of 400 hours data analysis on each topic over their summer period. Analysis questions were developed in conjunction with the clinical supporters.

Clinical supporters

Dr Nigel Millar oversight role (Chief Medical Officer, Canterbury DHB) (Now Southern DHB)
Dr Matthew Croucher (Psychiatry of Old Age Specialist, Canterbury DHB)
Dr Val Fletcher (Geriatrician, Canterbury DHB)

Co-coordinator: Dr Hamish Jamieson (Geriatrician, Canterbury DHB & Otago University)

Supervisors from Canterbury University

Prof Jennifer Brown (Head of Department of Statistics, University of Canterbury)
Prof Philip Schluter (Head of Health Sciences, University of Canterbury)
Prof Tim David (High Performance Computing, University of Canterbury)

Approach

Students were given permission to access the interRAI Homecare 9.1 data from Sept 2012 to June 2015. There are 47,000 consented assessments.

The data was linked with health outcome data from NMDS (including hospital admissions, residential care and mortality data).

Purpose

To analyse the interRAI homecare 9.1 data that has been collected from the South Island DHBs.
To produce clinically relevant information on Health of Older Persons Service Level Alliance (HOPSLA) priority areas.
To provide reports useful for SI Health Service Planning.

Predictors of Poor Outcomes in Dementia

Student: Annabelle Bos

Supervisors: Dr. Hamish Jamieson, Prof. John Dalrymple-Alford, Prof. Jennifer Brown, Prof. Philip Schluter

Department of Mathematics and Statistics
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Christchurch 8140, New Zealand

Aim

The aim of this project was to compare complex older people in the community who have a dementia diagnosis to those without a dementia diagnosis in terms of predictors of poor outcomes such as admission to age residential care and mortality. This review was completed using anonymised data from the International Residential Assessment Instrument – Home Care (interRAI c9.1) administered September 2012 until February 2015.

Findings

Participants were determined to have dementia if they received a primary or present diagnosis of Alzheimer's disease or other dementias at the time of their assessment. Of the 44,095 participants, 9,843 (22.3%) of the population had a diagnosis of dementia while the other 34,252 (77.7%)were deemed to have no diagnosis of dementia.

Demographics such as age, gender, and ethnicity were similar for each population.
We found that a diagnosis of dementia is a clear predictor of entry to age residential care in this population but not a predictor of mortality. At the study's conclusion, only 26.1% of the non-dementia group entered age residential care in this time compared to a much higher 44.7% of those with dementia. The comparison of deceased people with dementia 29.7% and 30% of people with no dementia diagnosis was insignificant.

Contributing factors to age residential care admission in the population of those who had a diagnosis of dementia included:

- In terms of ethnicity, Europeans were more likely to enter age residential care than any other group with 46.5% admitted in the year following assessment. The admission to age residential care rates for the other groups followed as 31.6% of Maori, 32.9% of Asian, and 33.9% of the other ethnicities, while Pacific Islanders had the lowest rate at 19.3% admission in the first year. This is generally much lower than the admittance rates of those without dementia with the greatest increase in the European group.
- There was an 18.2% increase in age residential care admission in the year following their initial assessment if the person showed any degree of faecal incontinence. Those with dementia who reported as being infrequently faecal incontinent had an admission to age residential care rate of 57.0% which was higher than the rate of those in the no-dementia group who were completely incontinent (52.9%).

- Living status was also a predictor of age residential care admission. In the year following initial assessment 77.3% of those with dementia who were living with non-relatives entered age residential care. 49.3% of those living alone with a diagnosis of dementia entered aged residential care in the first twelve months following their assessment. People with dementia living with their spouse or partner and others had the best outcome with an age residential care admission rate of 30.4%.

Discussion

Analysis of InterRAI 9.1 data between September 2012 until February 2015 shows that there is a great difference in the rates of admission to age residential care between those diagnosed with dementia and those not. This finding points to the need for methods to improve the outcomes for those with dementia by exploring what will make it feasible for them to stay in their own home for longer.

There is more work to be done, however, in order to refine the results and find the areas which require the most improvements. Further investigation, after the end of the summer scholarship period, will look at potential causes underlying the poorer outcomes for those with dementia and how to reduce them.

Table 1:

Mortality

	Dementia	%	No Dementia	%
Deceased in the first year	1973	20.0	7736	22.6
Deceased at end of study	2922	29.7	10286	30.0

Graph 1:

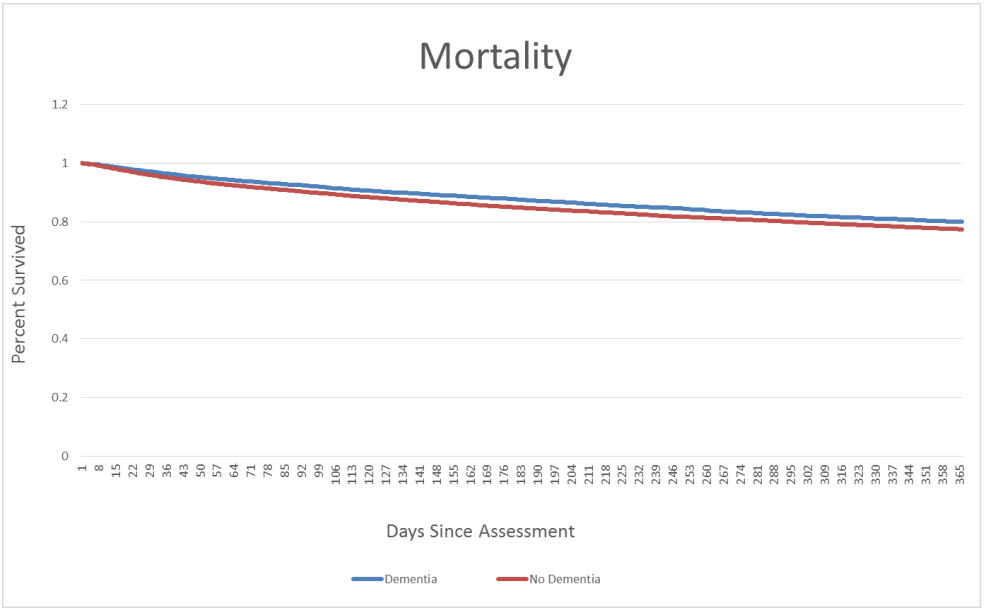
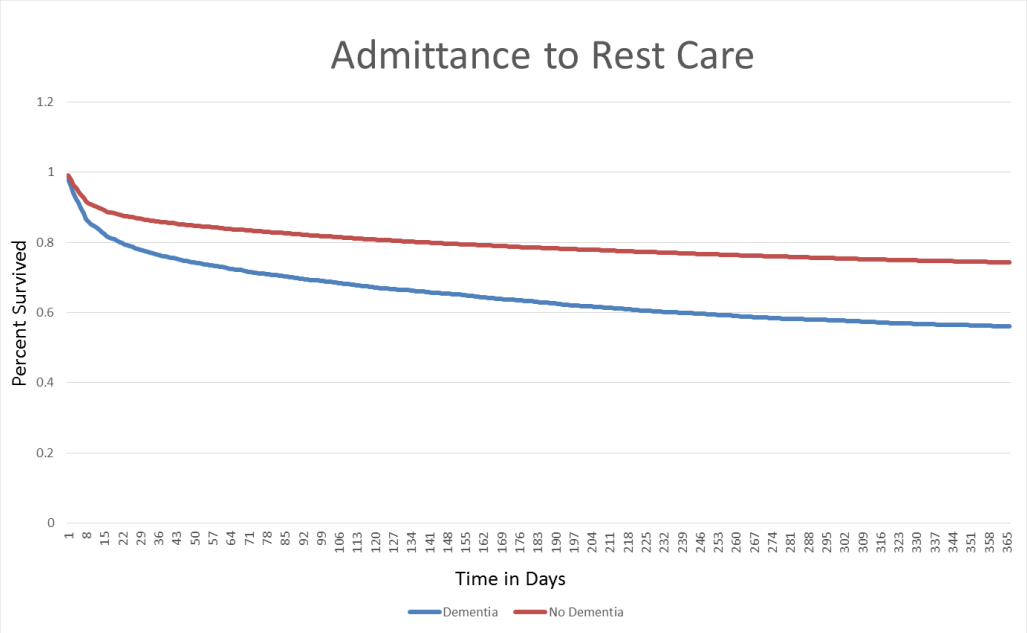


Table 2:

Entry to ARC

	Dementia	%	No Dementia	%
Admitted in the first year	4056	44.0	8273	25.7
Admitted by end of study	4400	44.7	8948	26.1

Graph 2:



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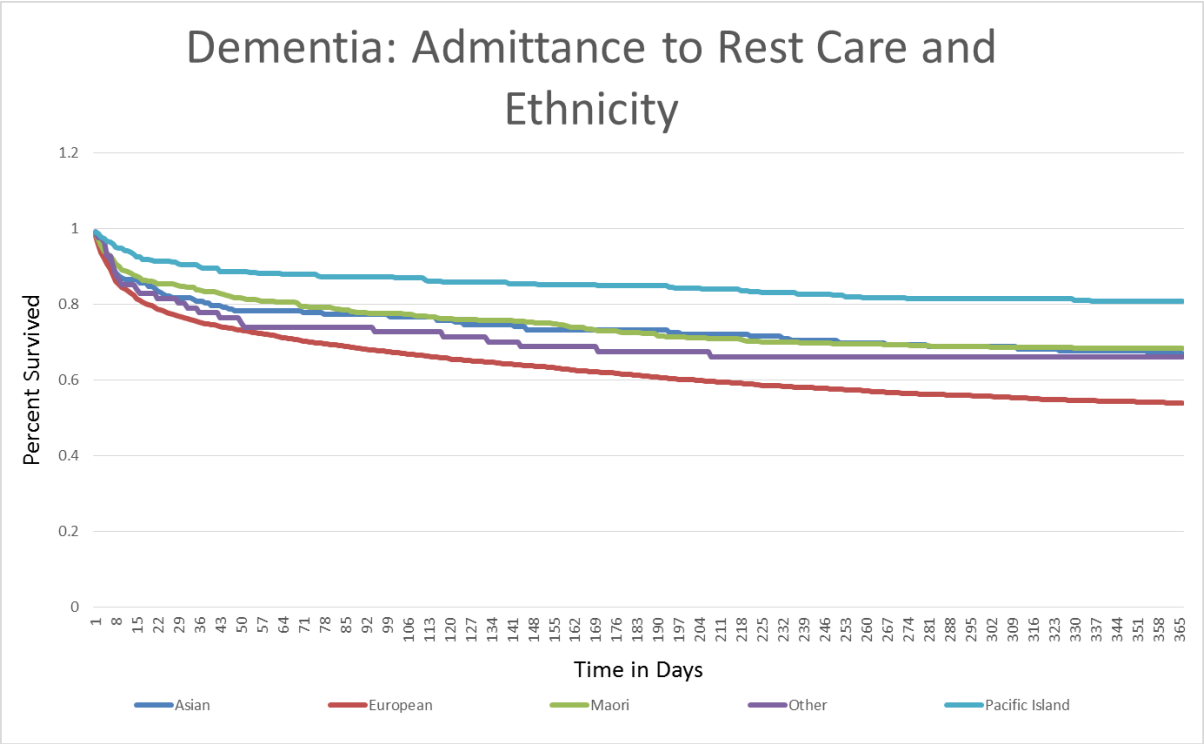
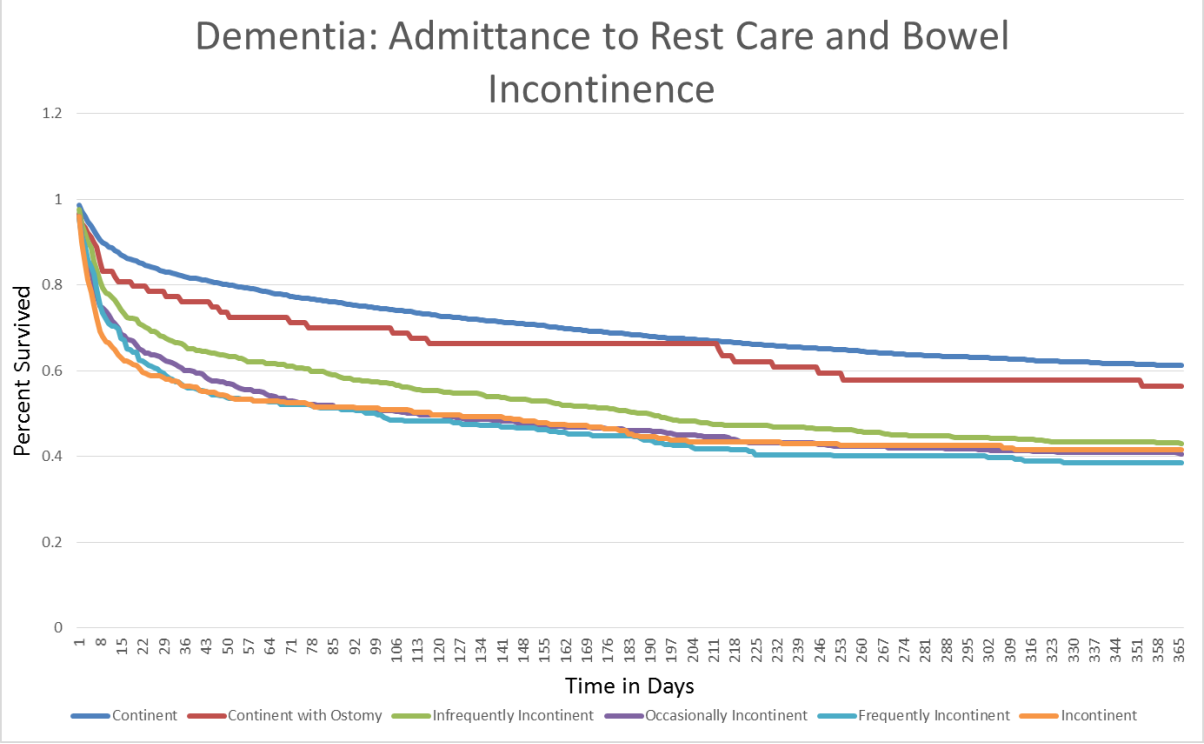


Graph 4:



End of life issues and the interRAI: Statistical Analysis of Mortality; An investigation of interRAI data.

Student: Philip Scott Petrie, UC Summer Student,

Supervisors: Professor Tim David, Dr Hamish Jamieson

High Performance Computing, University of Canterbury

Aim:

This project was to investigate and analyse mortality in a large health dataset on 45,409 elderly people, which included follow up data and hospital admission information. This investigation was focused on CHESS 5 and 4 people with comparisons also made between different District Health Boards.

Findings:

Multiple datasets had to be matched by unique identifiers that had been encrypted for anonymity. Once matched, summary statistics were calculated for the mortality rates of different CHESS scores, average lengths of stay as well as mortality rates for different District Health Boards around New Zealand. CHESS 5 and 4 people had mortality rates of 90.2% and 59.1% respectively. For CHESS 5 people, 97 died in hospital which is 23% of those that died. For the CHESS 4 people, 28% died in hospital with 612 of the 2183 deaths occurring during a hospital admission.

The average length of stay for CHESS 5 patients was 8.3 days and for CHESS 4 patients it was 8.7 days. The mortality rates for the different DHB's of CHESS 5 and 4 people were similar to the overall mortality rates of 90% and 60%.

When looking at the mortality rates for CHESS 4 and 5 people by DHB, there were no major differences worth noting. The majority had similar mortality rates to the overall mortality rate of people with scores of CHESS 4 and 5.

The length of stay averages for the DHB's yielded interesting results. The biggest observed difference is between the larger DHB's and the more rural DHB's. Looking at the larger DHB's showed that they had longer average lengths of stay upwards of 10 days, whereas smaller, more rural DHB's had average lengths of stay less than 7 days.

Discussion:

This study is the first assessment of mortality rates and hospital admissions of people who have had an interRAI assessments in New Zealand. People with CHESS 5 scores have an end stage disease as well as a decline in cognition and a decline in their Activities of Daily Living. It showed that people who scored 5 on the CHESS scale had a very high mortality rate of over 90% in one year. Despite this 23% died in hospital – often after long admissions. For those scoring a CHESS 4 the one year mortality was also high at 59.1%. Of those who died 28% died in hospital occasionally after a long admission. In future the CHESS scores may be used by assessors to explore the use of an Advanced Care Plan, ideally these people have had a discussion and expressed their choices so that health teams are guided by the person's wishes.

The study also showed interesting differences in lengths of stays for CHESS 4 and 5 patients with the larger DHBs having longer lengths of stays. Reasons for this would require more research.

Graph 1:

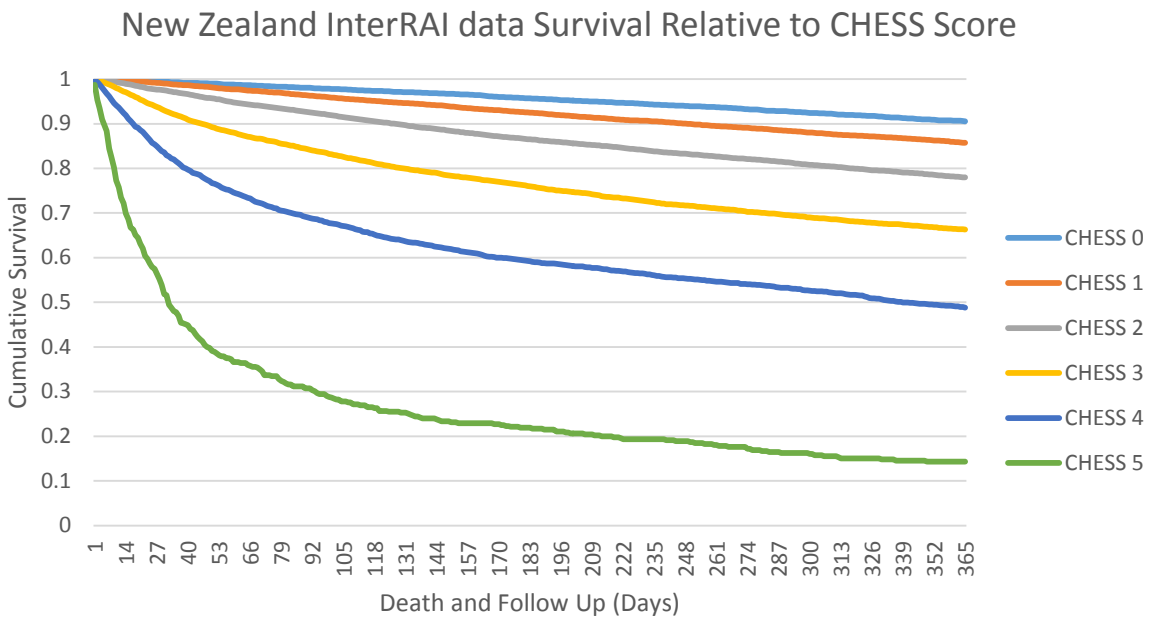


Table 1:

CHESS 5 DHB Length Of Stay

CHESS 5	DHBDOM									
	Northland	Waitemat	Auckland	Counties I	Waikato	Lakes	BOP	Tairawhiti	Hawkes B	Taranaki
	11	21	22	23	31	42	47	51	61	71
Mean LOS	**6.75**	**11.11**	**12**	**9.82**	**4.71**	**1.4**	**7**	**5.43**	**6.7**	**4.58**
	MidCentra	Whangan	Capital &	Hutt Valle	Nelson Ma	West Coas	Canterbur	Southern	Overseas	.
	81	82	91	92	101	111	121	160	999	Total
Mean LOS	**12.17**	**4**	**16.91**	**12.25**	**9.18**	**4.5**	**12.38**	**7.03**	**27**	**6.95**

This table displays the average lengths of stay for different DHB's. Since averages are heavily influenced by outliers, or unusually large values, the South Canterbury DHB and Wairarapa DHB are not shown due to having no recorded people in the cut-off of 270 hospital admissions.

Predictors of Hip Fracture amongst older adults living in their home

Student: Losana Vao Latu
Role: PGDip in Statistics
Supervisor : Prof. Philip Schluter , Dr. Hamish Jamieson

Department of Mathematics and Statistics , University of Canterbury, Christchurch.

AIM:

The aim of this project was to identify risk factors for hip fractures in people aged 65 or older who are receiving Home care. Cox proportional hazards regression was used to estimate the risk of hip fractures associated with demographic and other variables using the International Residential Assessment Instrument (interRAI) health information which was routinely collected with follow up from 1 July 2012 to 30 June, 2014.

Findings.

Eligible clients were identified with hip fractures if they were survivors who received primary or present diagnosis of any hip fractures within the time of assessment or deceased after the completion date of assessment with hip fracture. The overall hip fracture prevalence of the eligible 35,625 clients was 2.8%, of these, 66.7% associated with falls. The prevalence of hip fracture increased with age and females had a higher prevalence than males.

Predictors of Hip Fractures	Hazard Ratio	Confidence Interval (95%)	P – value
DEMOGRAPHIC			
75 – 84 years	1.56	1.02 – 2.35	0.04
85 – 94 years	1.96	1.30 – 2.96	*
95+ years	1.96	1.13 – 3.39	0.01
Male	0.53	0.42 – 0.65	**
CAPs			
ADL Facilitate improvement(L2)	1.98	1.57 – 2.50	**
ADL Prevent Decline(L1)	0.87	0.57 – 1.31	0.64
Cognitive Monitor (L1)	0.71	0.55 – 0.92	0.01
Cognitive Prevent Decline(L2)	0.84	0.65 – 1.08	0.18
Fall-Medium Risk(L1)	2.08	1.66 – 2.59	**
Fall -High Risk(L2)	1.83	1.40 – 2.40	**
Medication (L1)	0.55	0.39 – 0.78	*
Nutrition -Medium Risk(L1)	1.39	1.08 – 1.79	0.01
Nutrition - High Risk(L2)	1.26	0.89 – 1.78	0.20
DIAGNOSES Dementia	1.34	1.06 – 1.69	0.01
FUNCTIONAL STATUS			
No. of days went out of the house in which he			
1 to 2 days	0.52	0.41 – 0.65	**
3 days	0.47	0.36 – 0.62	**
Locomotion / Walking			
Bed- bound	1.99	1.20 – 3.31	0.01
Time for meter walk			
99, not tested - does not walk on own.	1.32	1.05 – 1.67	0.02
Distance wheeled self			
Did not use wheelchair	0.62	0.48 – 0.79	**

HEALTH CONDITION			
Pain Symptoms Consistency of pain			
Intermittent	1.32	1.08 – 1.62	0.01
Constant	1.12	0.81 – 1.56	0.49
Smokes Tobacco daily	1.55	1.04 – 2.31	0.03

p-value less than .01 = * , p- value less than .0001 = *

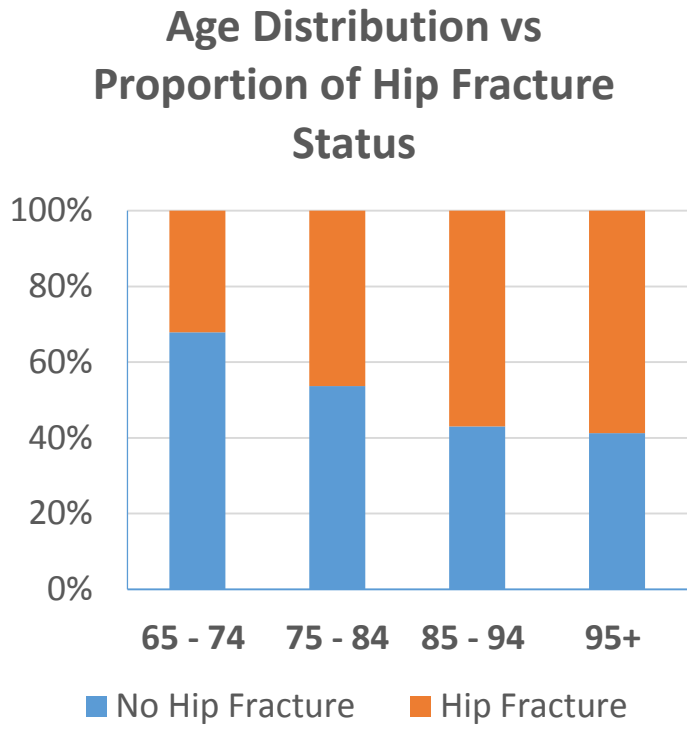
DISCUSSION:

The result of this study suggest that the most important predictors for hip fractures include age, gender and the following CAPs (Clinical Assessment Protocols) triggered from the InterRAI Home Care assessment: Activities of Daily Living, Falls, Nutrition, Cognitive Loss, Pain, Tobacco use.

CAPs triggered linked with protective factors are Cognitive (MonitorL1) and Medication, which may suggest the intervention strategies for these two CAPs are well planned and being closely followed in Home care setting.

The population age is increasing. . Without effective intervention strategies, the number of hip fractures will increase as the population ages. Since most of the risk factors of hip fractures are associated with falls, prevention strategies for falls must be highly considered in the Home care setting and focused on muscle strengthening and balance, and with attention to ADL performance, nutrition factors, medication intake and consistency of pain symptoms. Smoking termination should also be emphasized. However, further study is also needed to be conducted for the interaction between these variables.

Graph 1:



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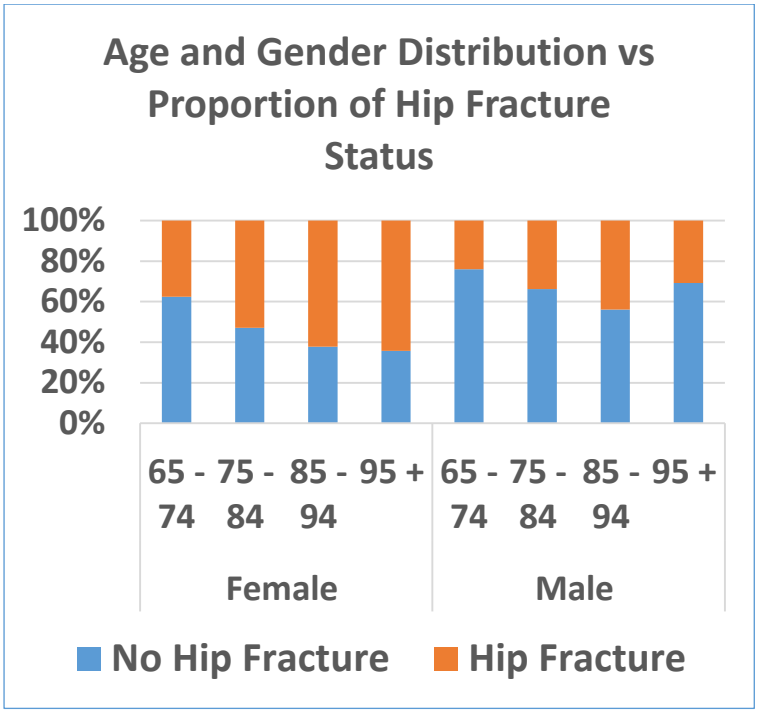

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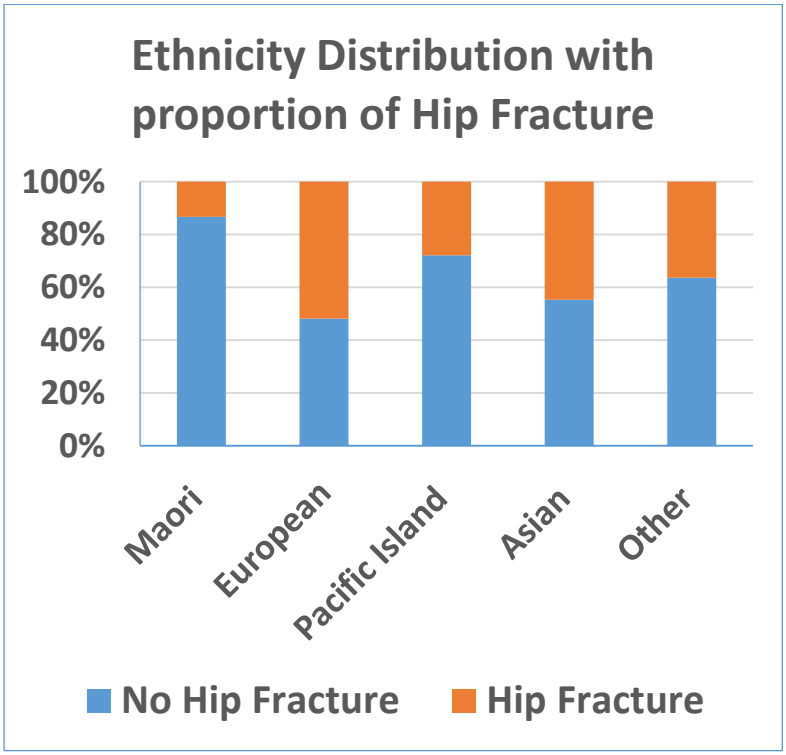

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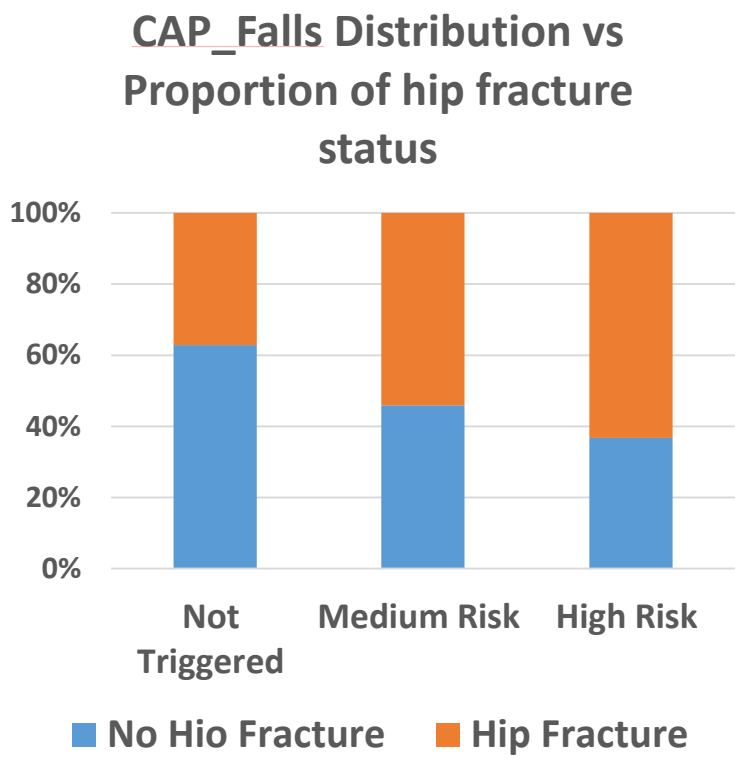

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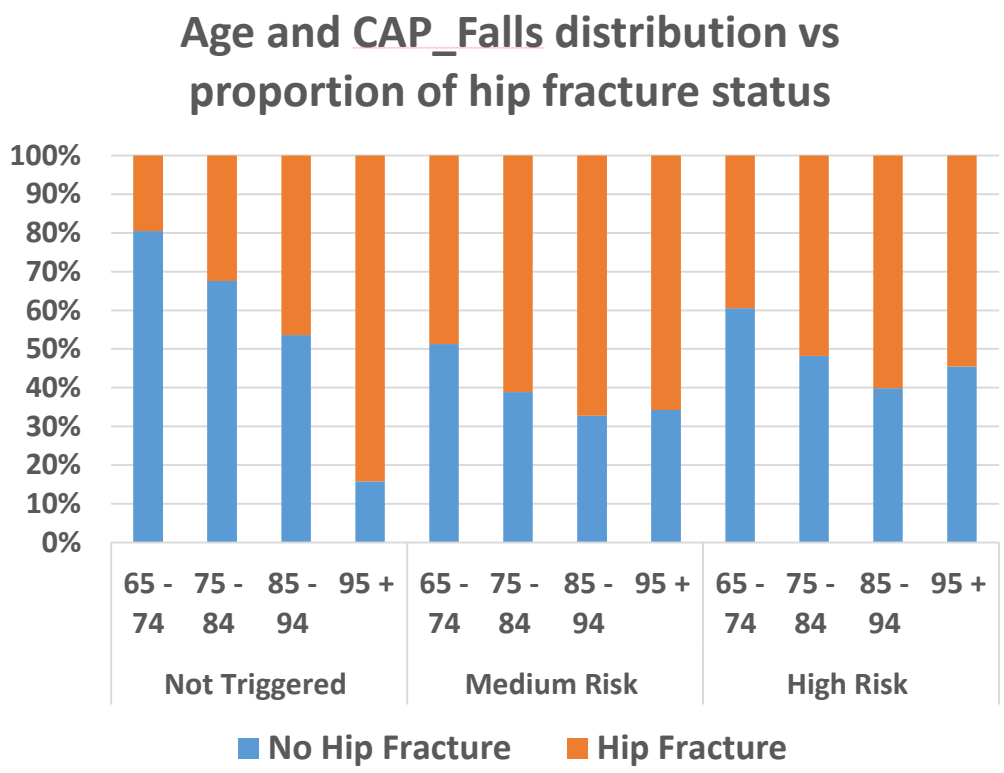

Pilot study - Developing a frailty scale from the interRAI

Student: Rosie Burn
Supervisor: Hamish Jamieson, A. Prof Ruth Hubbard (University of Queensland)
Sponsor: Canterbury Healthcare of the Elderly Education Trust and Canterbury Osteoporosis Society

Department of Medicine, University of Otago, Christchurch

Introduction:

Frailty is hard to quantify, there is no solitary definition which is able to define frailty. At some point in older adult's lives, they become frail. This frailty is present among a group of people who are usually associated with co-morbidities, disability, and poor self-rated health; and this can indicate the group of people who are most exposed to adverse outcomes. When characterising a frail person, both psychological and physical deterioration are considered.
In this pilot study, the international residential assessment instrument (interRAI) home care assessment was used to analyse the status of older people. InterRAI is a standardised national older person's assessment which collects information on a broad range of variables. As of December 2014, 60,145 community assessments had been performed in New Zealand. There is hope that integrating a frailty measure into the standardised assessment could help with clinical judgement and administration when distributing the health budget, without any additional burdens on the individuals.

Aim/s:

To derive a frailty index (FI) for New Zealand from the collected interRAI, to determine if it can be used as a predictor of adverse outcomes such as admission into residential care and mortality.

Method/s:

For this study, 5657 older people from the CDHB were analysed based upon their interRAI assessment. 5580 (99%) of these patients were 65 years and older. The interRAI assessments were taken between April 2007 and September 2013. We have a follow-up period of up to 5 years. Mortality and residential care admissions has been matched to the data, along with the CHESS and MAPLe scores, which are predictors of mortality and residential care admissions respectively. Kaplan-Meier curves have been used to look at the relationships between CHESS scores and mortality as well as MAPLe scores and admission to residential care. The interRAI collects information on a broad range of variables, such as comorbidities, function, and activities of daily living (ADL). Not all of the variables in the assessment are relevant to developing a frailty score, and so only some variables that met the criteria of the frailty definition were selected. Once the variables were selected they were then recoded into deficits, with cut-offs for each deficit determined through repeated analysis. The process was more complex for some questions than for others due to the different scales each item is assessed by. The assessment has variables recorded on binary,

ordinal and continuous scales; for example, mobility is recorded on an ordinal scale from 0 to 8, whereas memory is recorded on a binary scale of 0 = okay or 1 = memory problem, thus each variable was recoded differently.

The optimal number of deficits was determined (62) and individual patient frailty scores were calculated by summing the number of deficits for each individual, divided by the total number of deficits considered (62). Each patient had a frailty score between 0 and 1.
The distribution of the frailty index was assessed as well as the appropriateness of using the Frailty index as a predictor of residential care admissions as well as mortality. The frailty score was grouped on a scale of 0 through 5, where 0 was the least frail, while 5 was the most frail.

Results:

- It was found that the frailty index approximately normally distributed with a mean of 0.27 (±0.17).
- The frailty index was found to be a very good predictor of admissions into residential care, almost as good as MAPLe scores. There was a great difference between frailty index 0 and frailty index 5. For FI 0, 10% of this group would have been admitted into residential care, while after 5 years 30% would have. Whereas, for FI 5, after 1 year 45% of this group are predicted to have been admitted into residential care, while after 5 years, 65% would have.
- The frailty index was found to be a good predictor of mortality, although not quite as good as the CHESS score. Again there was a great difference between FI 0 and FI 5. After 1 year, there was a mortality rate of 15% and after 5 years 45%. While FI 5 had a mortality rate of 40% after 1 year and greater than 90% after 5 years.
- The FI scores are able to separate the people who are at the greatest risk of adverse outcomes.

Conclusion:

After producing a frailty score from the interRAI data, the frailty index was compared with existing CHESS and MAPLe scores. These scores are both very good independent predictors of one outcome, using few questions from the interRAI. Whereas, the frailty index is derived from many variables, including those used in CHESS and MAPLe scores, and thus is able to predict both mortality and residential care admissions from the one scale. The frailty index has been developed as a research tool; it has a 5 year follow up and therefore can predict up to 5 years ahead, thus it is a better long term predictor. Further work could allow this tool to be used clinically.