Student: Katie Mulholland
Title: Retrospective analysis of outcomes in Christchurch myeloma patients following the introduction of new therapies
Supervisors: Dr Sean MacPherson, Dr Peter Ganly, Dr Barry Hock, Dr Judy McKenzie
Sponsor: *The Bone Marrow Cancer Trust*

Introduction:
Myeloma is a blood cancer that develops in the bone marrow where plasma cells proliferate and produce a substantial amount of a clonal protein. Disrupting the bone marrow can have significant effects such as decreasing red and white blood cell production thus affecting oxygenation of the body and also impairing immunity. Other symptoms can include bone pain, fractures, renal failure and even spinal cord compression. This cancer affects <1% of the NZ population and is more common in the elderly, thus with the ageing NZ population, its incidence is rising.
Myeloma is incurable, but treatment effectiveness and patient survival has improved significantly with the availability of novel chemotherapy drugs. PHARMAC controls the funding of these novel agents (Thalidomide, Bortezomib and Lenalidomide). The availability of these drugs for patients has changed dramatically over the last 20 years. This study will compare data from a previous study undertaken in the Christchurch haematology department from 2000-2010 where access to drugs was more limited in order to determine whether overall survival has improved due to a change in treatment options.

Aim:
To determine survival of myeloma patients who were diagnosed and treated in Christchurch hospital following the change in funding of novel agents in May of 2011. This data will then be compared with that obtained in the same department for patients diagnosed 2000-2010.

Impact:
This study will more accurately define the outcomes of Christchurch myeloma patients treated with currently funded drugs. This "real life" information will allow both better assessment of the impact of these drugs and a better understanding of patient prognosis using these therapies.

Method:
Data for 343 patients diagnosed between May 2011 and November 2017 was collected using online medical records. Information available was used to extract the following for each patient:

i. Basic clinical details
ii. Features of myeloma e.g. disease staging, prognostic data, lab results
iii. Treatments, side effects
iv. Date of last hospital contact or death

Patients were categorised into 3 treatment groups; '*elderly*' defined as those aged ≥70, '*young transplant*' who were <70years and received an autologous stem cell transplant, and '*young non-transplant*' who were aged <70 and received only chemotherapy.
Data was analysed using statistical software to investigate overall survival of the different patient groups. Data from Statistics NZ was also used to enable a comparison of overall survival of myeloma patients vs. the age and sex matched NZ population.

Results:

It was found that the overall survival for myeloma patients has increased since 2010 from an average of 44 to 56 months (*See Figure 1).* This difference was particularly marked in elderly patients whose median overall survival time has increased from 17 to 28 months *(See Figure 2).* It was found that for younger patients there was no difference in overall survival. Elderly patients had the worst survival of the 3 treatment groups, and transplant patients the best. It is worth noting that those eligible for transplant are generally younger and have less comorbidities.

The cause of the increased survival was concluded to be the increased prescription of novel agents with prescription rates changing from 56% to 85%. For elderly this change was from 40% to 77%. Data showed that patients who received novel agents had a statistically significant better overall survival compared to those who did not. *(See Figure 3).*

Figure 1

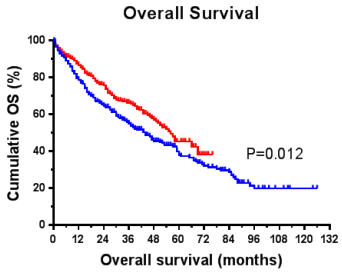
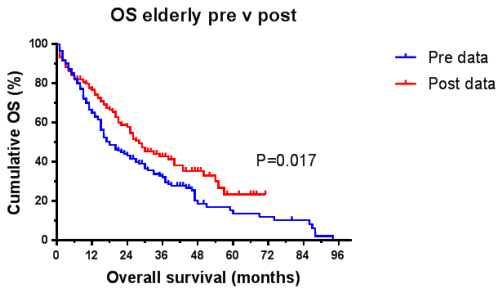


Figure 2



A further analysis was undertaken for the transplant group that showed that progression free survival has doubled from 20 to 40 months, meaning that transplant patients have a longer 'healthy' period of time post transplant before their myeloma progresses to produce symptoms or large amounts of clonal protein *(See Figure 4).* Overall survival of transplant patients has not changed. This longer time period without chemotherapy drugs suggests a better quality of life is being obtained for these patients through the use of novel agents which is clinically important.

Figure 3

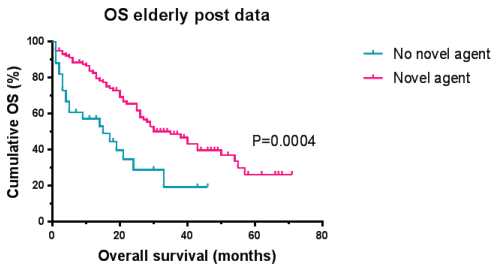
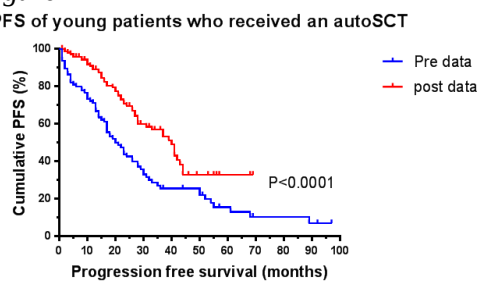


Figure 4



The relative survival of myeloma patients was also compared to an age and sex matched NZ population. At 5 years post diagnosis survival is 50% of that expected, showing that myeloma patients have a substantially worse survival rate than the general NZ population despite changes in treatment.

Conclusion:

Following the change in funding of novel agents, myeloma patients in Christchurch have shown a small but significant improvement in overall survival. Of the 3 treatment groups, only elderly were found to have an improved survival which was likely due to an increased prescription of novel agents. Autologous stem cell transplant patients now have an increased remission time since first treatment, however their overall survival has not changed which may be due to the fact a more diverse group of patients including a greater proportion aged >65 years are being offered a transplant. The data from this study will help better inform clinicians of their patient's expected survival, and also reinforce the advantage of the prescription of novel agents.