Outcome Inequalities in Multiple Myeloma Patients in England: Incidence and Survival Rates Stratified by Ethnicity and Index of Multiple Deprivation

Joanne R Winter[1], Joseph E O'Reilly[1], Lewis Carpenter[1] [1] Arcturis Data, Building One, Oxford Technology Park, Technology Drive, Kidlington, OX5 1GN UK, joanne.winter@arcturisdata.com

Introduction

- It is well established that sociodemographic factors are a significant factor affecting health outcomes, but their impact on survival for patients with multiple myeloma is not well studied as measuring deprivation for individual patients is difficult
- The Index of Multiple Deprivation (IMD) summarises relative deprivation across small geographic areas in the UK, incorporating the domains of health, education, living environment, income, employment, crime, and barriers to housing and services
- The Arcturis Real World Data Network contains anonymised electronic health records, as well as sociodemographic data not available in other UK observational datasets such as ethnicity and IMD score, and can therefore be used to study associations between sociodemographic factors and clinical outcomes

Objectives

- To assess the proportion of multiple myeloma patients represented in the Arcturis Real World Data Network
- To compare incidence and survival rates of multiple myeloma patients across different data sources:
  - The Arcturis Real World Data Network
  - Cancer registrations data from NHS England
  - The Haematological Malignancies Research Network (HMRN)
- To assess whether survival varied with ethnicity and Index of Multiple Deprivation quintile

Methods

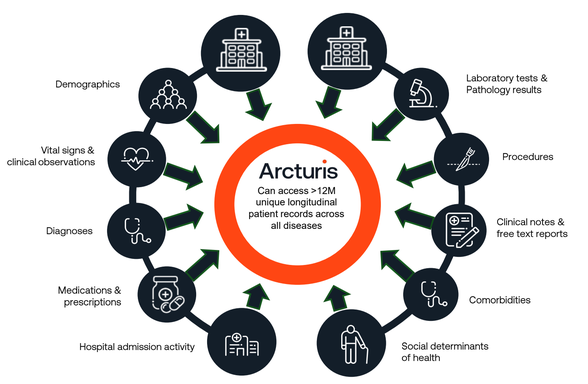

Figure 1: Data captured in the Arcturis Real World Data Network

- We identified patients with a first recorded diagnosis of multiple myeloma (ICD-10 code: C90.0) between 2013 - 2022 and calculated the number of new diagnoses and overall survival (OS) rates
- These estimates were compared to external data sources:
  - Estimates of incident case numbers were sourced from NHS England's cancer registrations data,[1] and from the HMRN,[2,3] a regional population which incorporates data from 14 Yorkshire hospitals and represents about 6% of the UK population[2,4]
  - Estimates of net survival were sourced from the HMRN
- Survival rates for the Arcturis dataset were also stratified by ethnicity and IMD quintile, but these could not be compared to external estimates
- We fitted Cox proportional-hazards models for OS, adjusted for age, sex, ethnicity and IMD quintile, and generated Kaplan-Meier survival curves to compare survival across groups

Results

- 3,878 multiple myeloma patients who were first diagnosed between 2013-2022 were identified from the Arcturis Real World Data Network
- This represents ~8% of MM patients nationally
- Age and sex distributions of incident case numbers were comparable across all data sources (Figure 2)
- Survival rates were comparable between Arcturis and HMRN when stratified by sex and age (Figures 3 and 4)

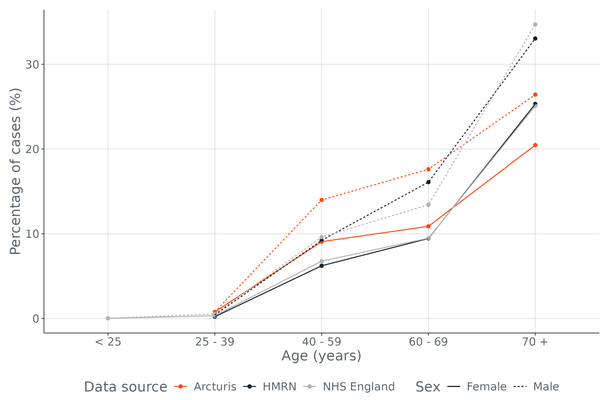

Figure 2: Age/sex breakdowns of incident multiple myeloma patients in three datasets

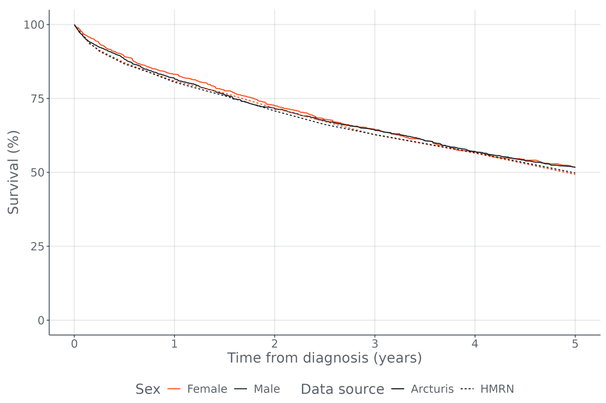

Figure 3: A comparison of survival rates between Arcturis and HMRN by sex

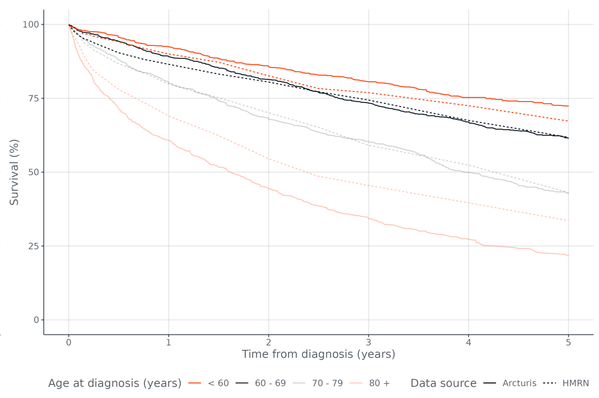

Figure 4: A comparison of survival rates between Arcturis and HMRN across age groups

- In adjusted analysis, IMD was not associated with OS (hazard ratio [HR] 1.00, 95% CI 0.98-1.03, Figure 5)
- Median age at diagnosis increased with IMD, from 64 years in the most deprived quintile (1) to 69 in the least deprived (5)

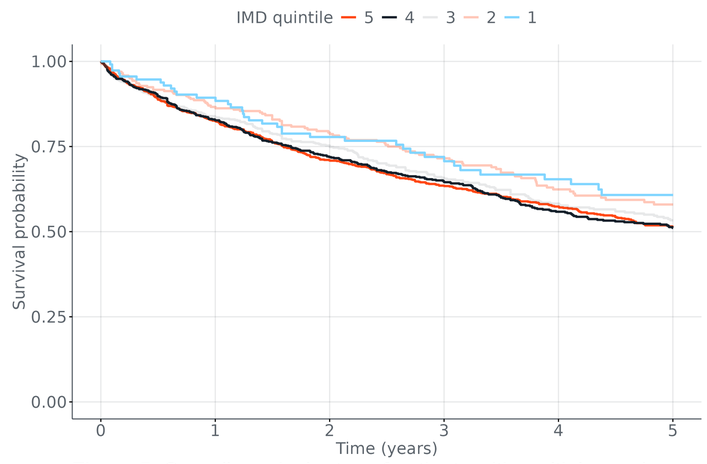

Figure 5: Overall survival rates of patients with multiple myeloma, stratified by index of multiple deprivation quintile

- OS was shorter for people of Asian ethnicity compared to white (HR 1.91, 95% CI 1.19-3.06, Figure 6), despite typically being younger at diagnosis (median age 65 vs. 69)
- OS amongst all other ethnicities was not significantly different

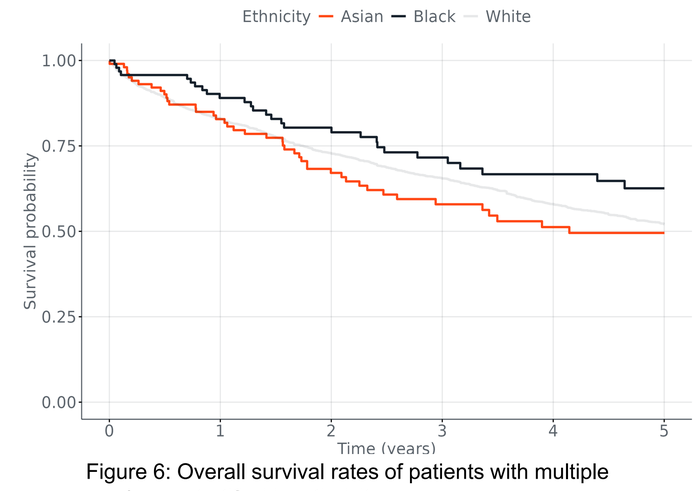

Figure 6: Overall survival rates of patients with multiple myeloma, stratified by ethnicity

Conclusion

- OS did not significantly vary with IMD, suggesting that multiple myeloma patients receive a similar standard of care irrespective of deprivation in their local area
- Despite adjusting for age group, distinguishing the effects of age and local deprivation is difficult – people living in less deprived areas may have greater longevity, but also people tend to live in less deprived areas as they get older – and there may be residual confounding
- We identified differences in adjusted OS amongst ethnicity groups. The cause of lower survival in patients of Asian ethnicity, despite diagnosis at younger ages, is unclear and requires further investigation
- Possible explanations include difficulties accessing care leading to later diagnoses, greater burden of comorbidity, or biological/genetic factors
- Comparisons of incidence and survival rates to external estimates suggest that these results are generalisable across the UK
- The Arcturis Real World Data Network accurately represents multiple myeloma patients, and provides key sociodemographic data not available elsewhere

Acknowledgements & References

- The Arcturis Real World Data Network has received research database ethical approval from the NHS Health Research Authority Yorkshire & The Humber - Leeds East Research Ethics Committee (REC Reference: 24/YH/0164)
- Data was provided by four partner NHS foundation trusts: Chelsea and Westminster, Cambridge University Hospitals, Oxford University Hospitals and Hampshire Hospitals
- Thank you to all the patients whose data contributed to this research

[1] Cancer registrations statistics, England 2021. https://digital.nhs.uk/data-and-information/publications/statistical/cancer-registration-statistics (2024)

[2] Roman E, Kane E, Howell D, Lamb M, Bagguley T, Crouch S, Painter D, Patmore R, Smith A. Cohort Profile Update: The Haematological Malignancy Research Network (HMRN) UK population-based cohorts. Int J Epidemiol. 2022 Jun 13;51(3):e87-e94. doi: 10.1093/ije/dyab275

[3] Li, J., Smith, A., Crouch, S. et al. Estimating the prevalence of hematological malignancies and precursor conditions using data from Haematological Malignancy Research Network (HMRN). Cancer Causes Control 27, 1019–1026 (2016). https://doi.org/10.1007/s10552-016-0780-z

[4] Population estimates for the UK, Engld, Wales, Scotland, and Northern Ireland: mid-2022. https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2022 (2024)

Introduction

- It is well established that sociodemographic factors are a significant factor affecting health outcomes, but their impact on survival for patients with multiple myeloma is not well studied as measuring deprivation for individual patients is difficult
- The Index of Multiple Deprivation (IMD) summarises relative deprivation across small geographic areas in the UK, incorporating the domains of health, education, living environment, income, employment, crime, and barriers to housing and services
- The Arcturis Real World Data Network contains anonymised electronic health records, as well as sociodemographic data not available in other UK observational datasets such as ethnicity and IMD score, and can therefore be used to study associations between sociodemographic factors and clinical outcomes

Objectives

- To assess the proportion of multiple myeloma patients represented in the Arcturis Real World Data Network
- To compare incidence and survival rates of multiple myeloma patients across different data sources:
  - The Arcturis Real World Data Network
  - Cancer registrations data from NHS England
  - The Haematological Malignancies Research Network (HMRN)
- To assess whether survival varied with ethnicity and Index of Multiple Deprivation quintile

Method

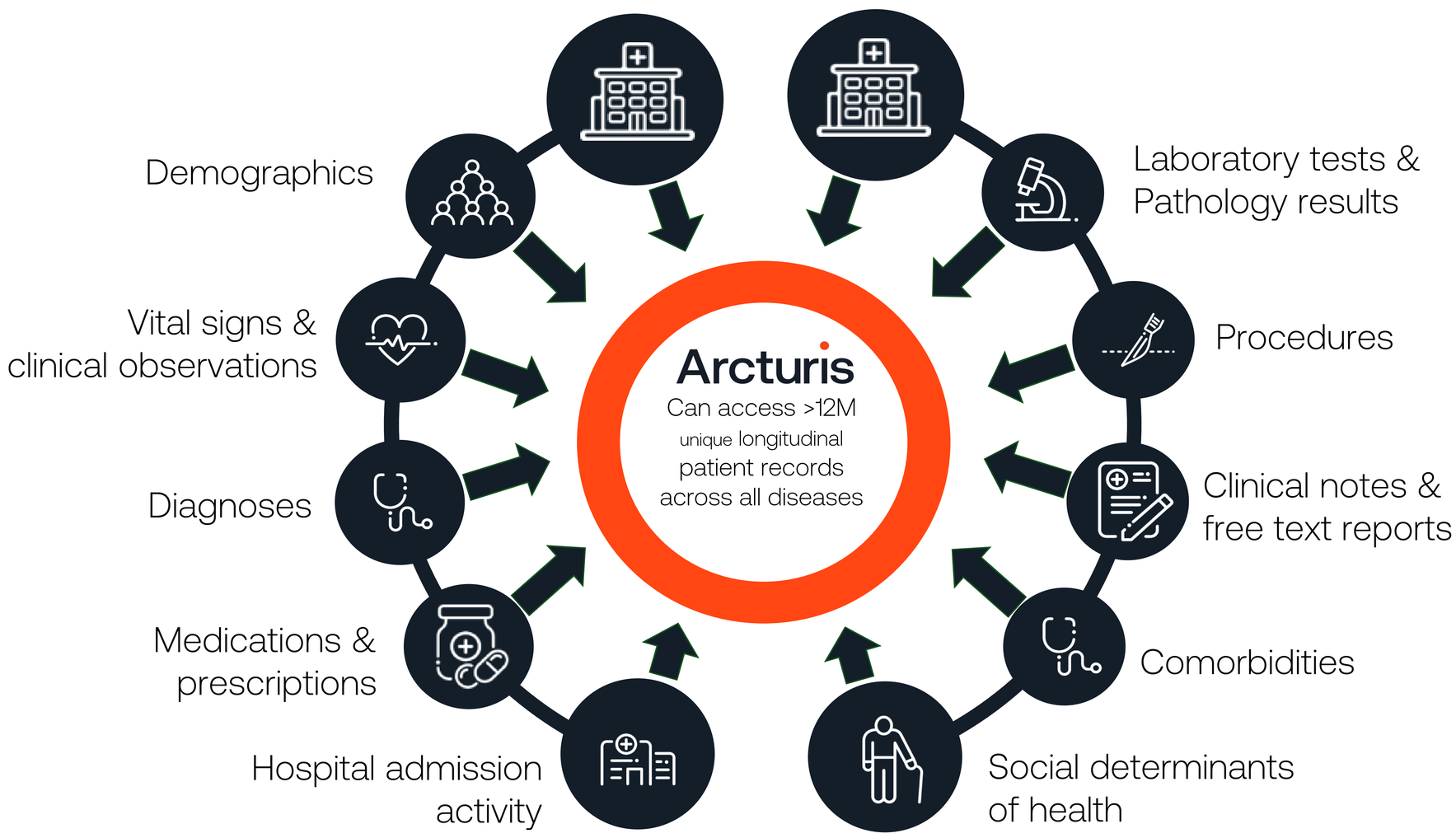

Figure 1: Data captured in the Arcturis Real World Data Network

- We identified patients with a first recorded diagnosis of multiple myeloma (ICD-10 code: C90.0) between 2013 - 2022 and calculated the number of new diagnoses and overall survival (OS) rates
- These estimates were compared to external data sources:
  - Estimates of incident case numbers were sourced from NHS England's cancer registrations data,[1] and from the HMRN,[2,3] a regional population which incorporates data from 14 Yorkshire hospitals and represents about 6% of the UK population[2,4]
  - Estimates of net survival were sourced from the HMRN
- Survival rates for the Arcturis dataset were also stratified by ethnicity and IMD quintile, but these could not be compared to external estimates
- We fitted Cox proportional-hazards models for OS, adjusted for age, sex, ethnicity and IMD quintile, and generated Kaplan-Meier survival curves to compare survival across groups

Results

- 3,878 multiple myeloma patients who were first diagnosed between 2013-2022 were identified from the Arcturis Real World Data Network
- This represents ~8% of MM patients nationally
- Age and sex distributions of incident case numbers were comparable across all data sources (Figure 2)
- Survival rates were comparable between Arcturis and HMRN when stratified by sex and age (Figures 3 and 4)

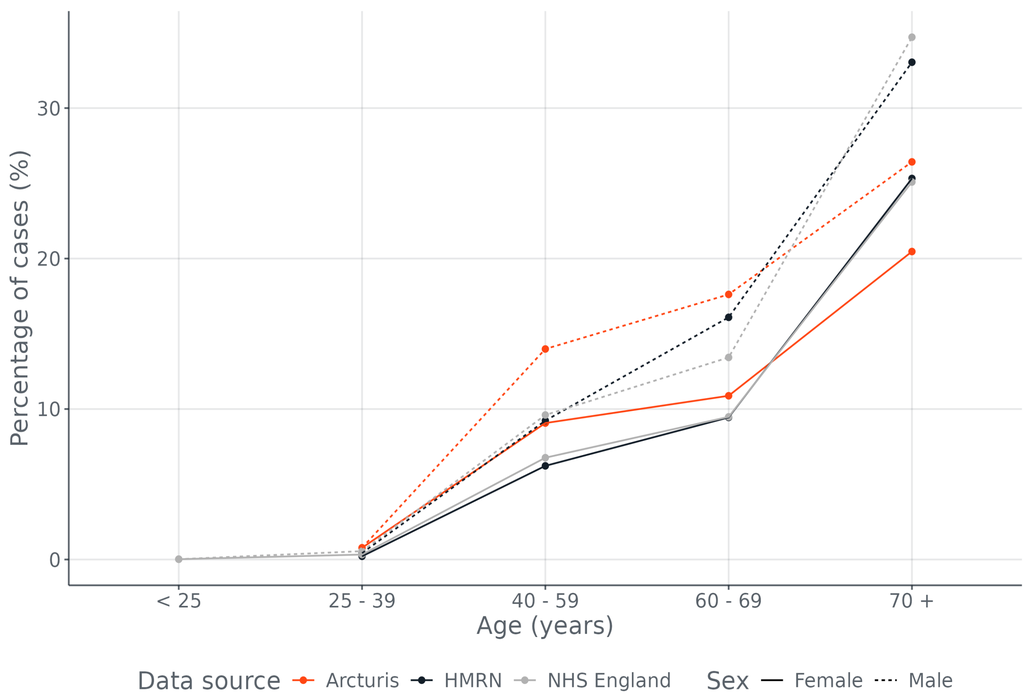

Figure 2: Age/sex breakdowns of incident multiple myeloma patients in three datasets

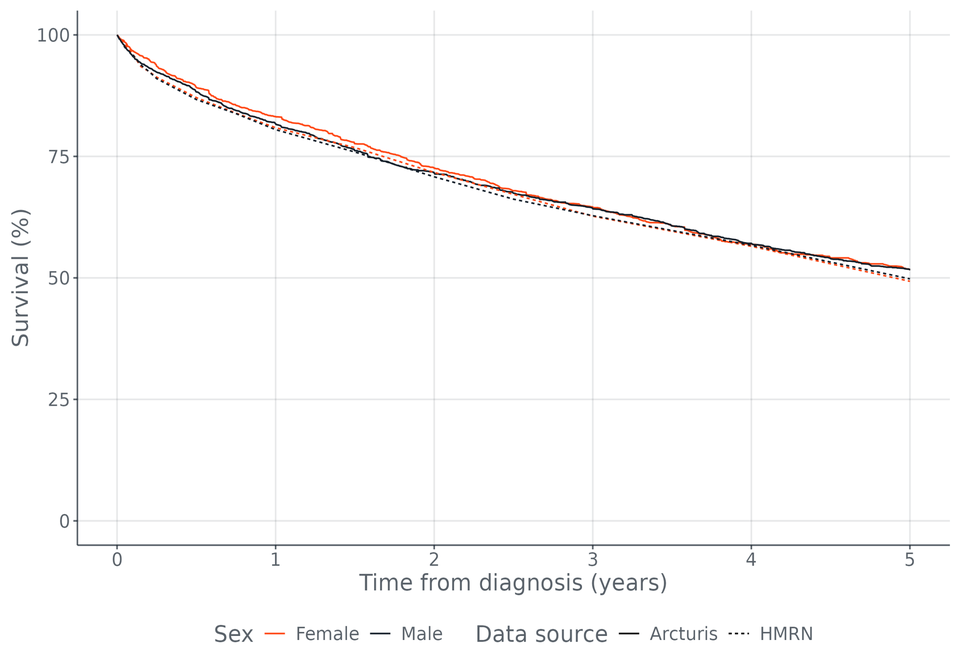

Figure 3: A comparison of survival rates between Arcturis and HMRN by sex

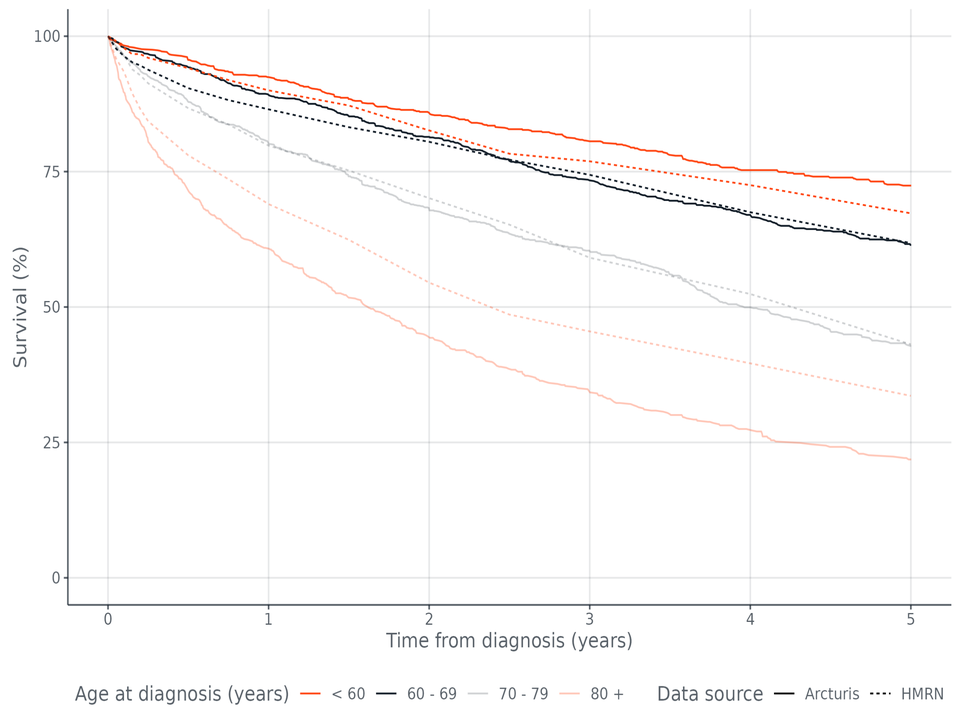

Figure 4: A comparison of survival rates between Arcturis and HMRN across age groups

Results

- In adjusted analysis, IMD was not associated with OS (hazard ratio [HR] 1.00, 95% CI 0.98-1.03, Figure 5)
- Median age at diagnosis increased with IMD, from 64 years in the most deprived quintile (1) to 69 in the least deprived (5)

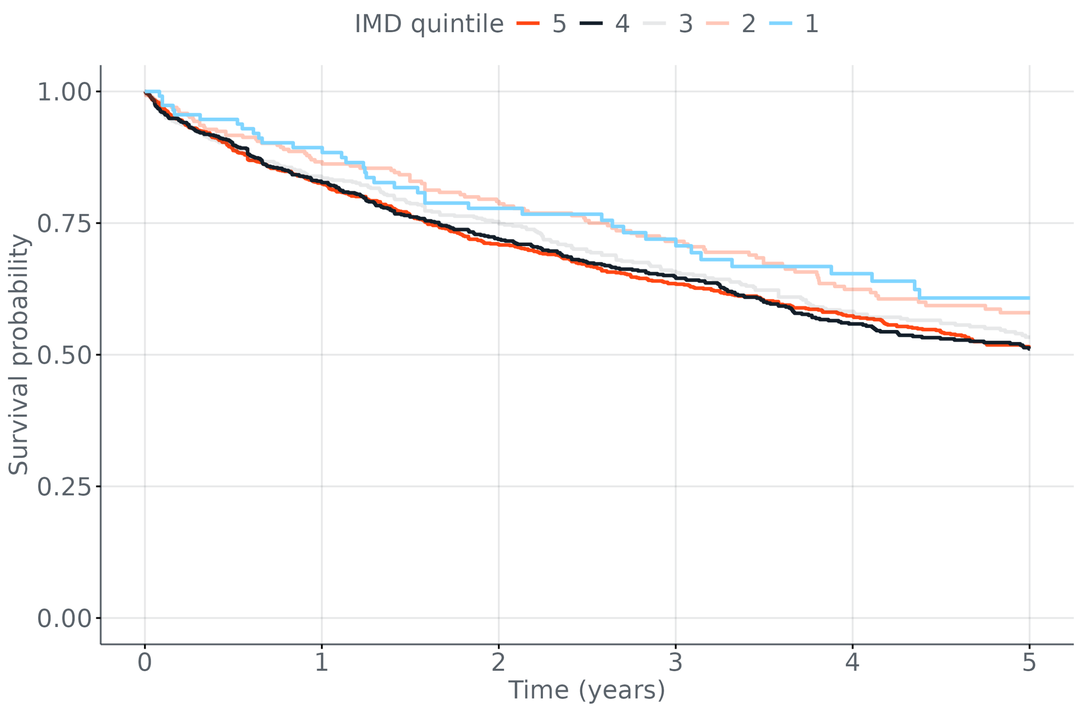

Figure 5: Overall survival rates of patients with multiple myeloma, stratified by index of multiple deprivation quintile

- OS was shorter for people of Asian ethnicity compared to white (HR 1.91, 95% CI 1.19-3.06, Figure 6), despite typically being younger at diagnosis (median age 65 vs. 69)
- OS amongst all other ethnicities was not significantly different

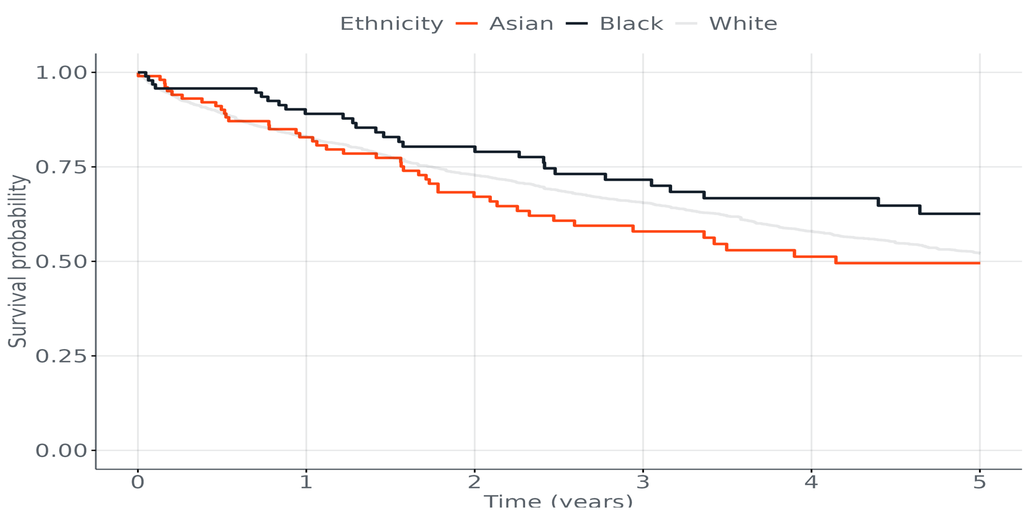

Figure 6: Overall survival rates of patients with multiple myeloma, stratified by ethnicity

Conclusions

- OS did not significantly vary with IMD, suggesting that multiple myeloma patients receive a similar standard of care irrespective of deprivation in their local area
- Despite adjusting for age group, distinguishing the effects of age and local deprivation is difficult – people living in less deprived areas may have greater longevity, but also people tend to live in less deprived areas as they get older – and there may be residual confounding
- We identified differences in adjusted OS amongst ethnicity groups. The cause of lower survival in patients of Asian ethnicity, despite diagnosis at younger ages, is unclear and requires further investigation
- Possible explanations include difficulties accessing care leading to later diagnoses, greater burden of comorbidity, or biological/genetic factors
- Comparisons of incidence and survival rates to external estimates suggest that these results are generalisable across the UK
- The Arcturis Real World Data Network accurately represents multiple myeloma patients, and provides key sociodemographic data not available elsewhere

Acknowledgements & References

- The Arcturis Real World Data Network has received research database ethical approval from the NHS Health Research Authority Yorkshire & The Humber - Leeds East Research Ethics Committee (REC Reference: 24/YH/0164)
- Data was provided by four partner NHS foundation trusts: Chelsea and Westminster, Cambridge University Hospitals, Oxford University Hospitals and Hampshire Hospitals
- Thank you to all the patients whose data contributed to this research

[1] Cancer registrations statistics, England 2021. https://digital.nhs.uk/data-and-information/publications/statistical/cancer-registration-statistics (2024)

[2] Roman E, Kane E, Howell D, Lamb M, Bagguley T, Crouch S, Painter D, Patmore R, Smith A. Cohort Profile Update: The Haematological Malignancy Research Network (HMRN) UK population-based cohorts. Int J Epidemiol. 2022 Jun 13;51(3):e87-e94. doi: 10.1093/ije/dyab275

[3] Li, J., Smith, A., Crouch, S. et al. Estimating the prevalence of hematological malignancies and precursor conditions using data from Haematological Malignancy Research Network (HMRN). Cancer Causes Control 27, 1019–1026 (2016). https://doi.org/10.1007/s10552-016-0780-z

[4] Population estimates for the UK, Engld, Wales, Scotland, and Northern Ireland: mid-2022. https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2022 (2024)