Doubling in median survival in patients diagnosed with multiple myeloma 2005-2019; a real-world study from the UK's Haematological Malignancy Research Network

Recent decades have seen an explosion of therapeutic agents being evaluated in multiple myeloma (MM) clinical trials, and many of these have subsequently been licensed. Sadly, however, despite such advances, MM remains incurable. In addition, the restrictive inclusion and exclusion criteria of many clinical studies often mean that the beneficial effects seen within trials are not uniformly translated across the general patient population once agents are approved for use in routine clinical practice.[1-3] Hence, understanding patterns of myeloma diagnosis and treatment in unselected real-world populations, and monitoring how they change over time in light of emerging therapeutic options, are key to informing clinical service strategy and clinical decision-making.

This paper examines MM treatment and survival trends in a UK population-based cohort of patients diagnosed between 2005-2019, with follow-up until 2023 (*https://hmrn.org*). Initiated in 2004 with the aim of providing robust generalizable data to inform research and clinical practice, the methods underpinning the Haematological Malignancy Research Network (HMRN) are described fully elsewhere.[4] Served by 14 hospitals, all blood cancers are diagnosed and coded using the latest World Health Organization classifications at a single integrated hematopathology laboratory, the Haematological Malignancy Diagnostic Service (*https://hmds.info/*). All patients are 'flagged' via their unique National Health Service (NHS) number and followed-up for death by NHS England (*www.nhsdigital.nhs.uk*), and routinely linked to national Hospital Episode Statistics Admitted Patient Care (HES-APC). HES-APC ICD-10 codes on preceding co-morbidities are used to calculate Charlson Comorbidity Index scores[5] and Hospital Frailty Risk Scores.[6] HES inpatient and outpatient data are also used to evaluate how patients accessed the NHS prior to their diagnosis, using the established "Routes to Diagnosis" methodology to identify emergency presentations.[7] In addition to incorporating nationally compiled healthcare data, all HMRN patients have diagnostic, prognostic, treatment, response and outcome information extracted from clinical and laboratory systems from diagnosis onwards, including myeloma-specific data required to calculate CRAB (hypercalcaemia, renal dysfunction, anemia, bone involvement) criteria[8] and International Staging System disease stage.[9] HMRN has full ethical approval (Leeds West Research Ethics Committee 04/Q1205/69) including Section 251 support under the NHS Act 2006.

Over the 15-year period 2005-2019, 3,809 HMRN residents were diagnosed with MM, of whom 3,720 (97.7%) were treated at one of the NHS hospitals within the HMRN region. Overall survival was calculated using standard time-to-event methods and net survival was estimated by the Stata program stns, with age- and sex-specific background mortality rates derived from national life tables;[10] this is a standard approach commonly used in population-based studies to consider other causes of death. All analyses were performed using Stata 18 (*https://www.stata.com/*).

With a male predominance (58.0%) and a median age at diagnosis of 72.6 years, 30.8% (1,095/3,720) of the MM patients initially presented to hospital via an emergency route, and this did not alter during the study period (Table 1). Overall, 86.6% (3,175/3,720) of patients were assigned a Comorbidity Index of one or below, and 80% a low-risk Hospital Frailty Risk Score. These frequencies varied over the 15-year time frame with a fall in the proportion of patients assigned to the low index/risk group; however, the diagnostic coding and data quality upon which the indices are based has improved over time.[11] As expected, the most frequent paraprotein isotypes were IgG (60.4%) and IgA (23.4%). The distribution of International Staging System disease stages shifted slightly over the period of the study; the proportion of patients with stage III disease decreased from 43.5% in 2005-2007 to 34.3% in 2017-2019, and the proportion with stage I disease increased from 19.8% to 30.4%. Diagnostic imaging practices also changed, moving from plain radiographic skeletal survey alone (74.2% in 2005-2007; 28.8% in 2017-2019) through to cross-sectional imaging techniques (*Online Supplementary Table S1*). Interestingly, the proportion of patients diagnosed with MM who did not have symptomatic disease defined by CRAB criteria increased during the study period, rising from 23.0% in 2005-2007 to 29.3% in 2017-2019, which is likely to be due to the new definition of myeloma-defining events in the revised International Myeloma Working Group criteria introduced in 2014.[8]

Following diagnosis, 65.3% of patients were treated with first-line chemotherapy, 26.0% were actively monitored, and an early choice of supportive/palliative care was made for 7.4%. As expected, patients' management varied with age; 72.8% of those diagnosed before 70 years old received first-line chemotherapy, compared to 67.3% of those aged 70-79, and 49.9% of those ≥80 years (P<0.001) (*Online Supplementary Table S2*). It is notable that among patients who met the CRAB criteria the proportion opting for active monitoring was 18% in those <70 years old, 25% in those aged 70-79, and 41% in those ≥80 years old; indicating a

higher likelihood of selecting this treatment course despite symptomatic myeloma at older ages. Looking only at the 2017-2019 cohort, the corresponding number for ≥80-year-olds fell to 20%, potentially as a consequence of more tolerable therapies having become available over time. Remaining broadly stable, around 45% of patients diagnosed <70 years who received first-line chemotherapy also had an autologous stem cell transplant. The propor-

Table 1. Baseline demographics, routes to diagnosis and disease characteristics, distributed by year of diagnosis: multiple myeloma, Haematological Malignancy Research Network.

Characteristics	Year of diagnosis					
	Total	2005-2007	2008-2010	2011-2013	2014-2016	2017-2019
Total, N (%)	3,720 (100)	637 (100)	740 (100)	775 (100)	755 (100)	813 (100)
Male	2,156 (58.0)	358 (56.2)	426 (57.6)	456 (58.8)	436 (57.7)	480 (59.0)
Female	1,564 (42.0)	279 (43.8)	314 (42.4)	319 (41.2)	319 (42.3)	333 (41.0)
Age at diagnosis in years, Median (IQR)	72.6 (64.5-79.8)	72.8 (63.0-80.0)	73.8 (64.8-80.7)	73.5(65.2-80.1)	71.8 (64.7-79.0)	71.4 (64.3-79.0)
<70, N (%)	1,515 (40.7)	261 (41.0)	277 (37.4)	297 (38.3)	322 (42.6)	358 (44.0)
70-80, N (%)	1,295 (34.8)	217 (34.1)	255 (34.5)	283 (36.5)	253 (33.5)	287 (35.3)
≥80, N (%)	910 (24.5)	159 (25.0)	208 (28.1)	195 (25.2)	180 (23.8)	168 (20.7)
Emergency presentation, N (%)						
No	2,456 (69.2)	365 (61.4)	481 (67.9)	534 (71.4)	519 (71.7)	557 (71.7)
Yes	1,095 (30.8)	229 (38.6)	227 (32.1)	214 (28.6)	205 (28.3)	220 (28.3)
Not known	169	43	32	27	31	36
Charlson Comorbidity Index, N (%)						
≤1	3,175 (86.6)	578 (90.9)	642 (87.1)	662 (86.6)	633 (85.3)	660 (84.0)
>1	490 (13.4)	58 (9.1)	95 (12.9)	102 (13.4)	109 (14.7)	126 (16.0)
Not known	55	1	3	11	13	27
Hospital Frailty Risk Score, N (%)						
Low risk	2,931 (80.0)	547 (86.0)	619 (84.0)	609 (79.7)	575 (77.5)	581 (73.9)
Intermediate risk	650 (17.7)	86 (13.5)	105 (14.2)	136 (17.8)	149 (20.1)	174 (22.1)
High risk	84 (2.3)	3 (0.5)	13 (1.8)	19 (2.5)	18 (2.4)	31 (3.9)
Not known	55	1	3	11	13	27
Paraprotein						
Type, N (%)						
IgG	2,167 (60.4)	402 (64.8)	426 (60.5)	437 (59.2)	447 (61.3)	455 (57.2)
IgA	841 (23.4)	143 (23.1)	176 (25.0)	183 (24.8)	161 (22.1)	178 (22.4)
IgM	32 (0.9)	3 (0.5)	6 (0.9)	11 (1.5)	6 (0.8)	6 (0.8)
Light chain only	415 (11.6)	58 (9.4)	67 (9.5)	73 (9.9)	93 (12.8)	124 (15.6)
Other[a]	132 (3.7)	14 (2.3)	29 (4.1)	34 (4.6)	22 (3.0)	33 (4.1)
Not known	133	17	36	37	26	17
Concentration, g/L						
Median (IQR)	21.0 (9.0-35.0)	24.0 (11.0-37.0)	19.0 (9.0-35.0)	19.0 (7.0-33.0)	20.0 (7.0-34.0)	21.9 (10.0-38.0)
Mean (SD)	23.9 (19.8)	26.5 (20.5)	23.6 (19.7)	21.9 (20.1)	23.0 (19.0)	25.0 (19.5)
International Staging System stage,[b] N (%)						
I	734 (26.7)	87 (19.8)	107 (24.0)	169 (28.2)	174 (28.3)	197 (30.4)
II	991 (36.1)	161 (36.7)	182 (40.8)	212 (35.3)	208 (33.8)	228 (35.2)
III	1,022 (37.2)	191 (43.5)	157 (35.2)	219 (36.5)	233 (37.9)	222 (34.3)
Not known	973	198	294	175	140	166
CRAB symptoms,[c] N (%)						
No	926 (27.0)	126 (23.0)	168 (25.1)	215 (29.4)	194 (27.0)	223 (29.3)
Yes	2,502 (73.0)	422 (77.0)	502 (74.9)	516 (70.6)	524 (73.0)	538 (70.7)
Not known	292	89	70	44	37	52

[a]None/non-secretory (N=81), IgD (N=30), IgA and IgG (N=13), IgG and IgM (N=4), IgA and IgM (N=2), IgE (N=2); [b]International Staging System (ISS) = I (β_2 microglobulin <3.5 mg/L and albumin ≥35g/L), II (β_2 microglobulin <3.5 mg/L and albumin <35 g/L or β_2 microglobulin 3.5-5.5 mg/L), III (β_2 microglobulin ≥5.5mg/L). [c]CRAB, elevated calcium, renal failure, anemia, bone lesions: Yes indicates at least one of the following: hypercalcemia (serum calcium: >0.25 mmol/L higher than the upper limit of normal or >2.75 mmol/L), renal insufficiency (creatinine clearance <40 mL/min or serum creatinine >177 μmol/L), anemia (hemoglobin >20 g/L below the lower limit of normal or hemoglobin <100 g/L) or bone disease, one or more osteolytic lesions on skeletal radiography, computed tomography, or positron emission tomography-computed tompgraphy; No indicates all negative; Not known: indicates none positive and at least one incomplete datum. IQR: interquartile range; SD: standard deviation.

tion of patients included in first-line clinical trials varied with age and year of diagnosis; the former largely reflecting trial eligibility criteria, and the latter the timing of the trials. Coinciding with National Cancer Research Institute (NCRI) Myeloma XI recruitment,[12] the highest trial entry frequencies were observed among patients initially treated with chemotherapy in 2011-2013; the proportions for the age groups <70, 70-79, and ≥80 years old being 53%, 42.1% and 23.1%, respectively.

Stratified by age and time-period, Table 2 presents data on survival: 5-year overall and net survival (probability of surviving cancer in the absence of other causes of death), and median survival. In the whole cohort, the median survival rose from 2.4 years (95% confidence interval [95% CI]: 2.1-2.7) in 2005-2007 to 4.5 years (95% CI: 3.9-5.0) in 2017-2019, with 5-year overall survival increasing from 31.2% (95%CI: 37.9-41.1) in 2005-2007 to 46.3% (95% CI: 42.3-50.2) in 2017-2019. The net survival estimates for the whole cohort (46.1%; 95% CI: 44.1-48.2) was 6.6 percentage points higher than overall survival (46.1% *vs*. 39.5%); the difference between the two estimates tended to increase over time from 4.6 in 2005-2007 through to 8.2 in 2017-2019, suggesting that progressively more myeloma patients may be dying from other co-morbidities.

Among those initially treated with chemotherapy, while no discernible survival differences were detected between 2005-2007 and 2008-2010, a notable uplift occurred across all age groups in 2011 (Figure 1, Table 2); the 5-year net survival estimate increased by around 13 percentage points between 2008-2010 and 2011-2013. A further uptick is evident in the 2017-2019 cohort; the 5-year net survival estimate (all ages) increased from 42.1% (95% CI: 27.0-47.2) in 2014-2016 to 49.6% (95% CI: 43.7-55.4) in 2017-2019, with the effect being particularly pronounced in patients ≥80 years old.

Consistent with the implementation of the National Institute for Health and Care Excellence (NICE) Health Technology Appraisals, significant changes in MM therapy occurred over the study period[13] (Figure 1, *Online Supplementary Table S3*). As an explanation for the survival improvements seen in Figure 1 and Table 2, widespread adoption of bortezomib was seen after 2011 when it became routinely available for first-line therapy in England. Lenalidomide, cyclophosphamide and dexamethasone (RCD) usage rose to a peak in the 2011-2013 cohort, coinciding with its use in the large national NCRI Myeloma XI trial,[12] but thereafter did not find upfront licensing in this combination and was discontinued. Use of cyclophosphamide, thalidomide and dexamethasone (CTD) peaked in 2008-2010 and is now employed rarely. Over the time course of this cohort there was a clear transition to the use of parenterally delivered combinations, driven by the uptake of bortezomib. Underpinning the survival benefits

Table 2. Survival of all patients and those initially treated with first-line chemotherapy, stratified by year and age at diagnosis: multiple myeloma patients followed-up to 2023, Haematological Malignancy Research Network.

Survival outcomes	Year					
	Total	2005-2007	2008-2010	2011-2013	2014-2016	2017-2019
All patients						
All ages, N	3,720	637	740	775	755	813
5-year overall survival, % (95% CI)	39.5 (37.9-41.1)	31.2 (27.7-34.9)	33.9 (30.5-37.3)	42.6 (39.1-46.0)	42.4 (38.8-45.9)	46.3 (42.3-50.2)
5-year net survival, % (95% CI)	46.1 (44.1-48.2)	35.8 (31.3-40.2)	40.2 (35.9-44.6)	49.6 (45.3-54.0)	49.2 (44.8-53.7)	54.5 (49.6-59.5)
Median survival in years (95% CI)	3.5 (3.3-3.7)	2.4 (2.1-2.7)	2.6 (2.3-3.0)	4.0 (3.6-4.4)	3.9 (3.4-4.4)	4.5 (3.9-5.0)
Patients initially treated with chemotherapy						
All ages, N	2,429	414	460	498	502	555
5-year overall survival, % (95% CI)	35.5 (33.6-37.5)	29.0 (24.7-33.4)	27.3 (23.3-31.4)	38.1 (33.8-42.3)	38.3 (34-42.5)	43.3 (38.5-48.1)
5-year net survival, % (95% CI)	39.9 (37.5-42.2)	32.3 (27.1-37.4)	30.3 (25.6-35.1)	43.2 (38.2-48.3)	42.1 (37-47.2)	49.6 (43.7-55.4)
Median survival in years (95% CI)	3.2 (2.9-3.4)	2.3 (2.0-2.7)	2.3 (1.7-2.6)	3.6 (3.1-4.1)	3.5 (3.1-4.1)	4.4 (3.6-4.7)
<70 years, N	1,103	192	197	217	232	265
5-year overall survival, % (95% CI)	52.4 (49.3-55.4)	44.3 (37.2-51.1)	44.7 (37.6-51.5)	53.8 (46.9-60.1)	57.1 (50.5-63.2)	60.3 (53.0-66.7)
5-year net survival, % (95% CI)	55.1 (51.9-58.3)	46.4 (39.1-53.8)	46.8 (39.5-54.0)	56.4 (49.4-63.4)	59.9 (53.3-66.6)	63.5 (56.3-70.7)
Median survival in years (95% CI)	5.3 (4.9-5.8)	4.0 (3.2-5.0)	4.3 (3.4-5.0)	5.7 (4.7-6.6)	6.3 (5.0-6.9)	Not reached
70-79 years, N	872	142	160	190	181	199
5-year overall survival, % (95% CI)	27.5 (24.4-30.6)	22.5 (16.1-29.7)	20.0 (14.2-26.5)	31.6 (25.1-38.2)	28.6 (22.1-35.3)	32.3 (24.7-40.1)
5-year net survival, % (95% CI)	32.7 (29.0-36.4)	27.2 (19.0-35.4)	23.6 (16.3-30.9)	37.5 (29.7-45.4)	33.3 (25.5-41.0)	39.1 (29.7-48.4)
Median survival in years (95% CI)	2.6 (2.3-2.9)	1.8 (1.4-2.3)	1.8 (1.4-2.3)	2.9 (2.6-3.9)	3.0 (2.5-3.5)	3.1 (2.5-3.9)
≥80 years, N	454	80	103	91	89	91
5-year overall survival, % (95% CI)	10.1 (7.4-13.2)	3.8 (1.0-9.6)	5.0 (1.9-10.5)	14.3 (8-22.3)	8.2 (3.6-15.2)	20.0 (11.6-30.0)
5-year net survival, % (95% CI)	16.8 (11.7-22)	6.7 (-0.2 to 13.7)	9.1 (1.8-16.4)	24.2 (11.6-36.7)	13.3 (3.3-23.4)	33.1 (17.5-48.6)
Median survival in years (95% CI)	1.3 (1.1-1.6)	1.3 (0.7-1.8)	0.9 (0.6-1.0)	1.4 (0.9-1.8)	1.4 (0.9-1.8)	2.1 (1.7-3.3)

95% CI: 95% confidence interval.

shown in Table 2, the pronounced adoption of the triplet combination bortezomib, cyclophosphamide and dexamethasone (VCD) in the 2017-2019 cohort had a notable impact, even in patients aged ≥80 years old.

Documenting the changing symptom burdens, diagnostic technologies, therapies, and improvements in survival that have occurred in the real-world setting, this large representative population-based study includes information on 3,720 MM patients diagnosed in the UK over a 15-year period. Moreover, as the HMRN population has a socio-demographic profile that is broadly representative of the UK population as a whole, and patients within the region are treated according to NHS/national guidelines, the findings reported here can be extrapolated to the UK as a whole. Demonstrating the concordance between treatment advances and survival, to our knowledge this is the first report showing improvement in outcomes in the over 80-year age group of patients who, by definition, are considered frail. Hitherto, most data on outcomes in older age groups have focused on a single point in time. For example, with a median overall survival of 28.9 months in the over 80 years analysis, NCRI Myeloma XI data identified a stepwise reduction in overall survival with each decade of life, with molecular risk factors being less prognostic than performance status in older people.[14] An analysis of the Swedish Myeloma Registry[15] examined changes in outcome over time, finding no significant gain in overall survival in those over 80 years old with symptomatic myeloma between 2008-2010 and 2011-2015, which is

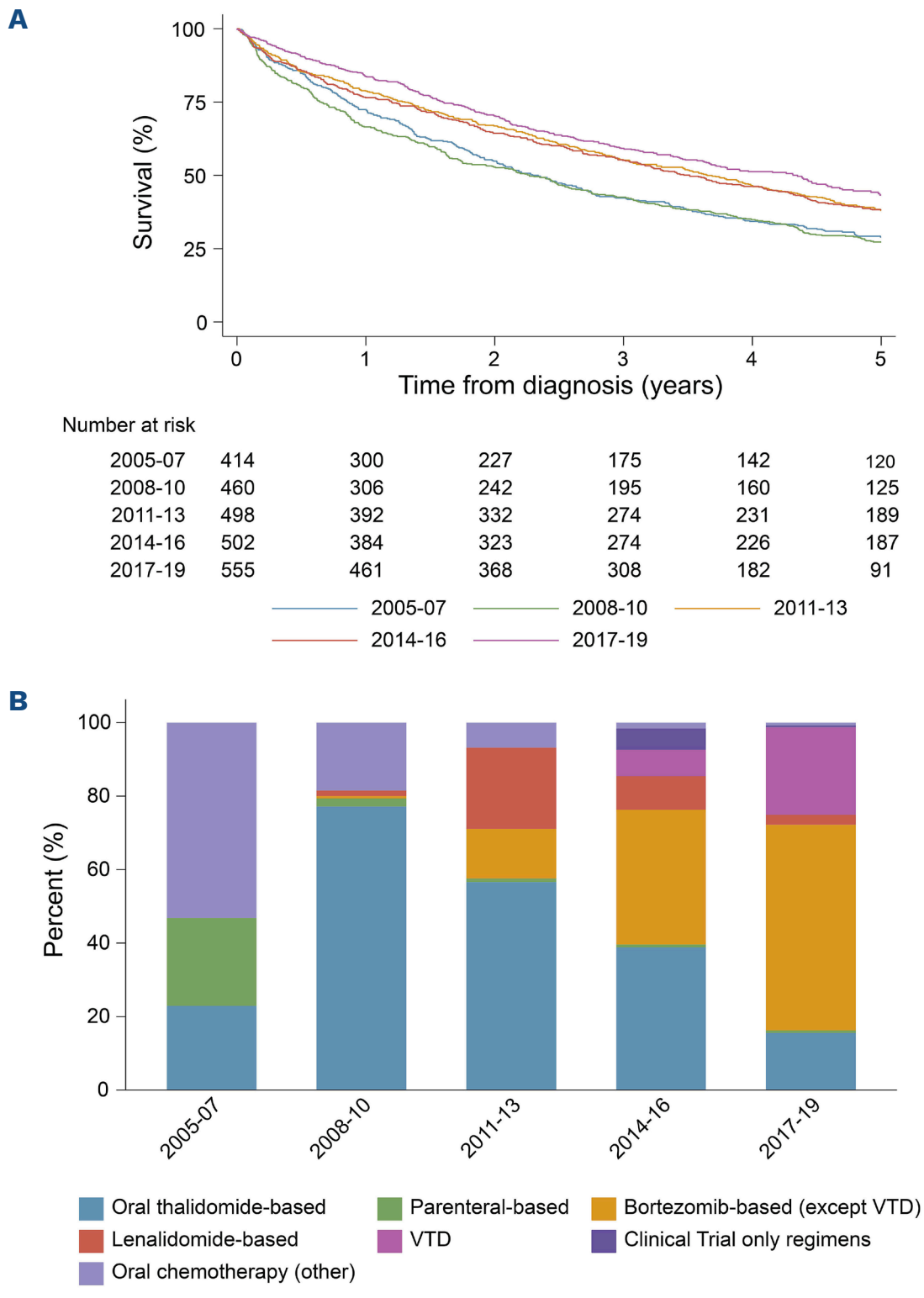

Figure 1. Overall survival and first-line regimen of patients initially treated with chemotherapy by year of diagnosis: multiple myeloma patients followed-up to 2023, Haematological Malignancy Research Network. (A) Overall survival. (B) First-line treatment regimen. VTD: bortezomib, thalidomide and dexamethasone.

consistent with our findings that only more recently have outcomes improved for this group. Indeed, a subsequent analysis of the Swedish Myeloma Registry including patients diagnosed up to 2019 with the addition of patients from Denmark (2005-2020) detected an improvement in survival in more recently diagnosed older patients.[16]

Improvements in outcome coincide with the introduction of bortezomib-based combinations. Since the introduction of these agents much has been learnt about optimal delivery in the real world, with weekly bortezomib scheduling and reactive dose reductions being utilized to minimise toxicity. The uplift in survival seen in over 80-year-olds in the 2017-2019 cohort may reflect this better understanding of optimal drug delivery and improved clinician confidence, resulting in better tolerated treatments and, therefore, superior responses. It may also be partially attributable to universal healthcare available in the UK enabling access to treatment for older patients, and certainly it points to the importance of not excluding older and frailer patients from clinical trials, since this group may benefit markedly.

In summary, our findings show impressive survival improvements over time for an unselected registry cohort, confirming that therapeutic advances are benefiting patients not only in clinical trials, but also in the real-world setting. The gains observed among the oldest patients who have for many years failed to access the benefits of advances in therapy are particularly gratifyingly.

Authors

Alexandra Smith,[1*] Timothy Bagguley,[1*] Eve Roman,[1] Simon Crouch,[1] Russell Patmore,[2] Ruth De Tute,[3] Andy Rawstron,[3] Gordon Cook,[4] Frances Seymour[4] and Christopher Parrish[4]

[1]Epidemiology and Cancer Statistics Group, Department of Health Sciences, University of York, York; [2]Queen's Centre for Oncology and Haematology, Castle Hill Hospital, Cottingham; [3]Haematological Malignancy Diagnostic Service, St. James's Institute of Oncology, Leeds and [4]Department of Haematology, Leeds Cancer Centre, St James's University Hospital, Leeds, UK

**AS and TB contributed equally as first authors.*

Correspondence:
A. SMITH - alexandra.smith@york.ac.uk

https://doi.org/10.3324/haematol.2024.287095

Received: January 4, 2025.
Accepted: March 10, 2025.
Early view: March 20, 2025.

Disclosures

GC has received honoraria from Amgen, Janssen and Takeda; has provided consultancy or advisory services for Amgen, AbbVie, BMS/Celgene, GSK, Janssen, Pfizer and Takeda; and has received research funding from Janssen, BMS/Celgene and Takeda. FS has received honoraria from Pfizer, J&J, Kite, Takeda and Novartis. RP has received honoraria from Roche and Gilead. CP has received payment for being an advisory board member for Sanofi and Pfizer and has received speaker's fees from Sanofi, Pfizer, Janssen, Amgen and Novartis.

Contributions

RP, CP, FS, AS and ER were responsible for the conception and design of the study. TB, AS and SC carried out the data management and statistical analyses. CP, FS, GC, RDT and AR provided diagnostic and clinical advice about the analysis and interpretation of the findings. CP, FS, ER, AS and TB drafted the paper. All authors contributed to the final draft.

Funding

This work was supported by Cancer Research UK and Blood Cancer UK (grant number 29685). AS, ER, FS and GC are supported in part by the National Institute for Health and Care Research (NIHR) Leeds Biomedical Research Centre (NIHR203331). The views expressed are those of the authors and not necessarily those of the National Health Service, the NIHR or the Department of Health and Social Care.

Data-sharing statement

Ethical approvals and data restrictions mean that data cannot be shared, but collaborative projects can be undertaken. The corresponding author can be contacted for more information.

References

1. Turesson I, Bjorkholm M, Blimark CH, Kristinsson S, Velez R, Landgren O. Rapidly changing myeloma epidemiology in the general population: increased incidence, older patients, and longer survival. Eur J Haematol. 2018;101(2):237-244.
2. Shah JJ, Abonour R, Gasparetto C, et al. Analysis of common eligibility criteria of randomized controlled trials in newly diagnosed multiple myeloma patients and extrapolating outcomes. Clin Lymphoma Myeloma Leuk. 2017;17(9):575-583.e2.
3. Richardson PG, San Miguel JF, Moreau P, et al. Interpreting clinical trial data in multiple myeloma: translating findings to the real-world setting. Blood Cancer J. 2018;8(11):109.
4. Smith A, Howell D, Crouch S, et al. Cohort profile: the Haematological Malignancy Research Network (HMRN); a UK population-based patient cohort. Int J Epidemiol. 2018;47(3):700.
5. Maringe C, Fowler H, Rachet B, Luque-Fernandez MA. Reproducibility, reliability and validity of population-based administrative health data for the assessment of cancer non-

related comorbidities. PLoS One. 2017;12(3):e0172814.
6. Gilbert T, Neuburger J, Kraindler J, et al. Development and validation of a Hospital Frailty Risk Score focusing on older people in acute care settings using electronic hospital records: an observational study. Lancet. 2018;391(10132):1775-1782.
7. Elliss-Brookes L, McPhail S, Ives A, et al. Routes to diagnosis for cancer – determining the patient journey using multiple routine data sets. Br J Cancer. 2012;107(8):1220-1226.
8. Rajkumar SV, Dimopoulos MA, Palumbo A, et al. International Myeloma Working Group updated criteria for the diagnosis of multiple myeloma. Lancet Oncol. 2014;15(12):e538-548.
9. Greipp PR, San Miguel J, Durie BGM, et al. International staging system for multiple myeloma. J Clin Oncol. 2005;23(15):3412-3420.
10. Office of National Statistics. Single-year life tables, UK: 1980 to 2020 - Office for National Statistics. https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/datasets/singleyearlifetablesuk1980to2018 Accessed October 6, 2022.
11. Herbert A, Wijlaars L, Zylbersztejn A, Cromwell D, Hardelid P. Data resource profile: Hospital Episode Statistics Admitted Patient Care (HES APC). Int J Epidemiol. 2017;46(4):1093-1093i.
12. Jackson GH, Davies FE, Pawlyn C, et al. Lenalidomide maintenance versus observation for patients with newly diagnosed multiple myeloma (Myeloma XI): a multicentre, open-label, randomised, phase 3 trial. Lancet Oncol. 2019;20(1):57-73.
13. National Institute for Health and Care Excellence. Myeloma: diagnosis and management [NICE Guideline No. NG35]. www.nice.org.uk/guidance/ng35 Accessed March 5, 2025.
14. Pawlyn C, Cairns D, Kaiser M, et al. The relative importance of factors predicting outcome for myeloma patients at different ages: results from 3894 patients in the Myeloma XI trial. Leukemia. 2020;34(2):604-612.
15. Blimark CH, Turesson I, Genell A, et al. Outcome and survival of myeloma patients diagnosed 2008-2015. Real-world data on 4904 patients from the Swedish Myeloma Registry. Haematologica. 2018;103(3):506-513.
16. Moore KLF, Turesson I, Genell A, et al. Improved survival in myeloma patients-a nationwide registry study of 4,647 patients ≥75 years treated in Denmark and Sweden. Haematologica. 2023;108(6):1640-1651.