Title: Disparities in enrollment into Multiple Myeloma clinical trials by Socioeconomic Deprivation

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Background: Disparities in patients enrolled into clinical trials compared to real world populations have been reported, particularly with underrepresentation of different racial groups. However, disparities in clinical trial access may also relate to socioeconomic factors. Social deprivation has been shown to impact overall survival (OS) of multiple myeloma (MM) patients, and hence adequate sociodemographic representation is required for clinical trials to be truly informative.

Aims: To identify the distribution of patients enrolled into MM clinical trials according to social deprivation and understand interactions with race, prognostic markers, and OS.

Methods: This was a single centre retrospective analysis of MM patients treated between 2014-2023 from electronic medical records. Social deprivation was assessed by postcode using the English Indices of Multiple Deprivation (IMD) ranking, derived from income, employment, health, education, housing barriers, services, crime, and living environment. Comparator data for MM incidence by social deprivation in London and England was obtained from the National Cancer Registration and Analysis Service (NCRAS, 2006-2015). OS was estimated using Kaplan Meier Curves and correlative analysis by Cox regression models with GraphPad prism V9.

Results: 580 consecutive patients at a single UK centre (University College London Hospital) receiving referrals from a wide geographical area were analysed. Patients were grouped in 3 cohorts: standard of care (SOC, n=212), clinical trials (n=355): early phase trials (EPT, Phase I/II, n=103) late phase trials (LPT, Phase II & III, n=252). Median age was 66 years (35-90), M:F ratio was 1.3:1 and had a median of 3 prior lines (0-14). 406 (70%) were White, 80 (13.8%) Black, 40 (6.9%) Asian, 38 (6.6%) Mixed/Other and 16 (2.8%) unknown.

There was a significant difference in social deprivation ranking between those enrolled into clinical trials compared to that expected for England, with fewer patients from more deprived areas being enrolled(p=<0.0001, Table 1), in both EPT and LPT groups. External referrals comprised almost half of the trials cohort (n=169, 47.6%) and were chiefly from less deprived areas compared to NCRAS data for England (p=0.02). LPT patients from more deprived areas had an inferior OS to those from less deprived areas (p=0.03), although this was not observed for EPT (p=0.82). The distribution of SOC patients was also from less deprived areas than expected for London (p<0.0001) indicating that patient referrals were skewed rather than the selection of referred patients for trials.

Overall the non-white trial patients were from more deprived areas than white patients (p=0.018), predominantly in the LPT group (p=0.003). No difference in social deprivation (p=0.25) was noted between white and non-white EPT patients. Whilst white patients were from less deprived areas

than non-whites, there was a significantly negative OS in the socially deprived white patient group (p=0.04). This was not observed in non-white patients.

Patients aged ≥ 75 with worse social deprivation indices had an inferior OS (p=0.01). This was not observed in those aged <75.

Conclusions: Patients enrolled into clinical trials at our centre were from less socially deprived areas than expected from the distribution of MM in London and England, reflecting skewed referral patterns by socioeconomic status. As these differences may impact upon overall survival, it is vital that enrolment into clinical trials is monitored by socioeconomic deprivation to ensure there is adequate representation of the geographical population.

Table 1: Comparison of social deprivation according to cohort and ethnicity

	Patient Group	1	2	3	4	5	Total	P-value Chi Sq
PATIENT COHORTS	England (NCRAS)	5023	4693	4200	3602	3026	20544	N/A
		24%	23%	20%	18%	15%		
	EP External + Internal Referrals	35	25	23	17	3	103	0.008**
		34%	24%	22%	17%	3%		
	LP External + Internal Referrals	62	39	56	70	25	252	<0.0001***
		25%	15%	22%	28%	10%		
	EP+LP External + Internal Referrals	97	64	79	87	28	355	<0.0001***
		27%	18%	22%	25%	8%		
	External Referrals SOC + EP + LP	111	86	87	95	33	412	0.0002
		27%	21%	21%	23%	8%		
	External Referrals EP+LP	54	33	38	32	12	169	0.02
		32%	20%	22%	19%	7%		
	Internal Referrals SOC + EP + LP	32	27	39	52	16	166	<0.0001***
		19%	16%	23%	31%	10%		
	Internal Referrals EP	3	1	1	3	1	9	0.63
		33%	11%	11%	33%	11%		
	Internal Referrals LP	6	8	7	21	6	48	0.0001
		13%	17%	15%	44%	13%		
	Internal Referrals EP+LP	9	9	8	24	7	53	<0.0001***
		17%	17%	15%	45%	13%		
ETHINICITY	White SOC + EP + LP	119	88	82	85	32	406	N/A
		29%	22%	20%	21%	8%		
	Non White SOC + EP + LP	19	22	43	59	15	158	<0.0001***
		12%	14%	27%	37%	9%		
	White EP	30	19	17	13	1	80	N/A
		38%	24%	21%	16%	1%		
	Non White EP	6	3	6	4	2	21	0.25
		29%	14%	29%	19%	10%		
	White LP	53	30	35	43	17	178	N/A
		30%	17%	20%	24%	10%		
	Non White LP	5	6	19	23	6	59	0.003
		8%	10%	32%	39%	10%		
	White EP+LP	83	49	52	56	18	258	N/A
		32%	19%	20%	22%	7%		
	Non White EP+LP	11	9	25	27	8	80	0.0018
		14%	11%	31%	34%	10%		

Note: Bold P values denote significant results (P <0.05). Quintiles derived from IMD data. 1 = Least Deprived, 5 = Most Deprived. EP = Early Phase. LP = Late Phase. SOC = Standard of Care.