Prevalence of left ventricular dysfunction in a UK community sample of very old people: the Newcastle 85+ Study

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Appendix

Supplementary Methods and Results

SUPPLEMENTARY METHODS

Sample recruitment

This study was nested in the Newcastle 85+ Study.[1,2] At baseline the study cohort was socio-demographically representative of the local population, and of England and Wales, including the proportion in care homes.[2,3] Following baseline assessment (Phase 1: 2006-7, n=854), Newcastle 85+ Study participants were re-assessed at 18 months (Phase 2: 2007-9, n=631) and again at 36 months (Phase 3: 2009-10, n=484). Loss between phases 1 and 3 was mainly due to deaths (62.7%, 232/370) with the remainder due to drop out. All Phase 2 core study participants re-contacted after 1st May 2008 (n=397) were eligible for this cardiac study and recruitment was continued into Phase 3 for those not invited in Phase 2 (n=131). In total, 528 Newcastle 85+ Study participants were eligible for the cardiac assessment and 80.9% (427/528) took part.

Pre-existing diagnoses of ischaemic heart disease and cerebrovascular disease

Ischaemic heart disease was determined from the following diagnoses/interventions recorded in the general practice medical records: angina, myocardial infarction, coronary artery bypass grafts, coronary angioplasty or coronary stent. In addition, participants without a diagnosis in the general practice records could be assigned on the basis of a 12 lead electrocardiogram with Minnesota codes commencing 1-1 or 5-1. Cerebrovascular disease was determined from the following diagnoses/interventions recorded in the general practice records: stroke, transient ischaemic attack or carotid endarterectomy.

Chronic disease count

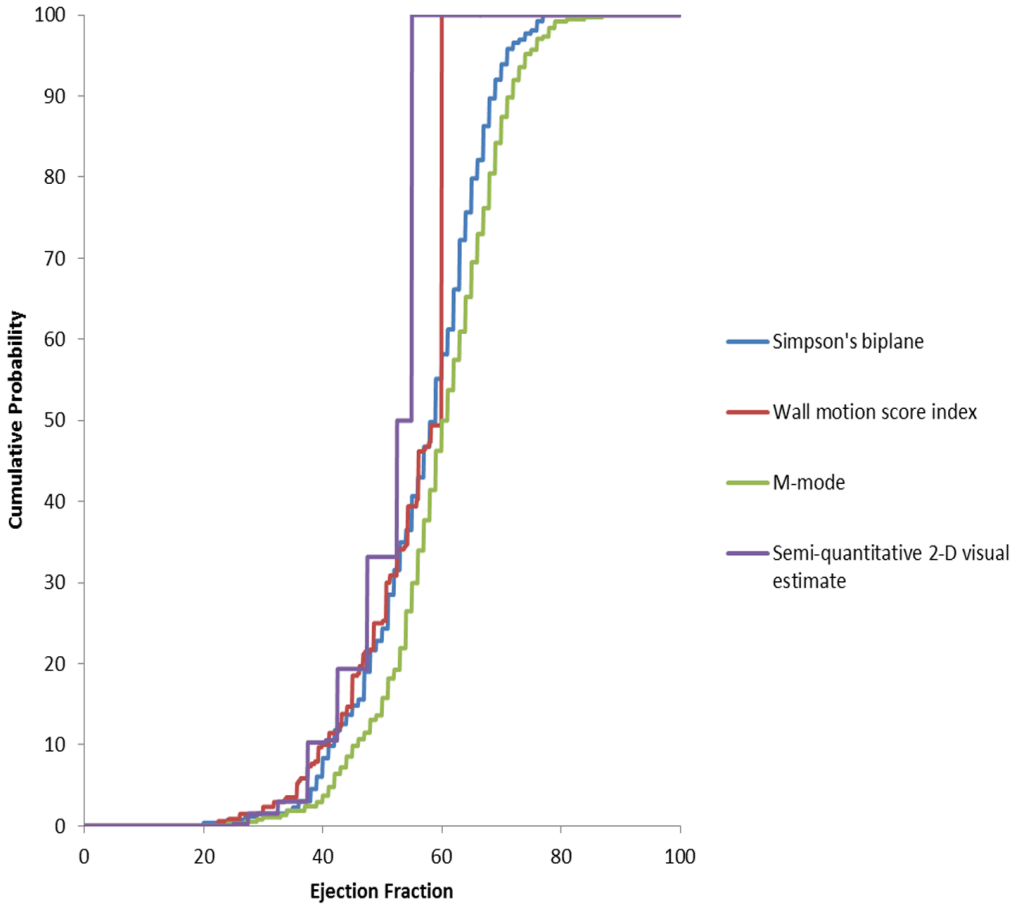
Eighteen chronic diseases were included in the disease count: hypertension; ischaemic heart disease; cerebrovascular disease; peripheral vascular disease; heart failure; atrial fibrillation; arthritis; osteoporosis; chronic obstructive pulmonary disease or asthma; other respiratory disease; diabetes mellitus; thyroid disease; cancer (within last 5 years) excluding non-melanoma skin cancer; eye disease; dementia; Parkinson's Disease; anaemia; and renal impairment. For ischaemic heart disease, diabetes, and thyroid disease, presence was defined as a diagnosis either in general practice records or from

electrocardiogram/blood test.[2] Atrial fibrillation was determined by 3 lead electrocardiogram, renal impairment by an estimated glomerular filtration rate of less than 30 ml/min/1.73m^2 (Modification of Diet in Renal Disease formula[4], and anaemia by World Health Organisation haemoglobin cut points of less than 13g/dl for men and 12g/dl for women[5]. For all other diseases, presence was taken from record review data alone. For heart failure, atrial fibrillation, anaemia and renal impairment, disease status was determined at the time of the cardiac assessment with other diseases determined at the Newcastle 85+ Study baseline phase.

Other data reported

Contemporaneous with the cardiac assessment, data on **prescribed medication** was extracted from the general practice records and directly from review of participants' medication. At the Newcastle 85+ Study baseline phase, **cognitive status** was assessed using the standardised mini-mental state examination[6]; **body mass index** was calculated from measured weight and height (derived from demi-span); and **ethnicity, place of residence and smoking status** (current smoker, ex-smoker, never) were obtained by self-report.

SUPPLEMENTARY FIGURE 1: Cumulative distribution plot of LV ejection fraction measured by Simpson's biplane volumetric method, 16-segment wall motion score index, M-mode, and semi-quantitative 2-D visual estimate



The maximum possible LVEF by wall motion score index was 60% and by semi-quantitative 2-D visual estimate greater than 55%. M-mode and Simpson's biplane are quantitative throughout the range of LVEF.

SUPPLEMENTARY TABLE S1: Left ventricular systolic function cross-tabulated with diastolic function[1]- alternative systolic function grading scheme

		LV SYSTOLIC DYSFUNCTION			
		NORMAL FUNCTION EF ≥55%	**MILD DYSFUNCTION EF 45-54%**	**MODERATE DYSFUNCTION EF 36-44%**	**SEVERE DYSFUNCTION EF ≤35%**
		% (n)	% (n)	% (n)	% (n)
LV DIASTOLIC FUNCTION	**NORMAL FUNCTION**	5.6 (21)	3.7 (14)	1.9 (7)	0.5 (2)
	MILD DYSFUNCTION	31.6 (119)	16.8 (63)	8.2 (31)	0.8 (3)
	MODERATE DYSFUNCTION	12.8 (48)	7.2 (27)	4.5 (17)	0.5 (2)
	SEVERE DYSFUNCTION	1.6 (6)	2.4 (9)	1.3 (5)	0.5 (2)

[1]Denominator for each cell is 376 i.e. the total number of participants in whom both systolic and diastolic function was quantified

SUPPLEMENTARY TABLE S2: Comparison of Newcastle 85+ Study with previous studies of LV systolic and diastolic dysfunction in older age groups; findings shown for age group closest to Newcastle sample in those studies recruiting from a wider age range

SYSTOLIC DYSFUNCTION

Study	number in older age group	age range (years)	Findings
Newcastle 85+ Study	376	87-89	Ejection fraction (EF) less than 55% = 48% ; EF 50% or less = 32%; EF less than 45% = 18%; EF 40% or less = 9%
Predictor Study[7]	713	75-84	EF less than 50%: men =8%, women= 2%; EF less than 40%: men= 5%, women= 1%.
Cardiovascular Health Study[8]	689	80+	EF less than 45% = 6%
Belfrail Study[9]	556	80+	EF 50% or less=6%; EF 40% or less=2%
Helsinki Ageing Study[10]	501	75-86	Systolic dysfunction (defined by fractional shortening of less than 0.25) = 11%
Jerusalem Study[11]	450	85	EF less than 55% = 44%; EF less than 45% = 14%
Olmsted County Study[12]	298	75+	EF 50% or less = 13%; EF 40% or less = 4%
Raymond et al[13]	129	80-89	EF 40% or less: men = 17%, for women = 4%
Canberra Heart Study[14]	118	80-86	EF 50% or less = 14%; EF 40% or less = 4%
Leiden 85-Plus Study[15]	81	90	EF less than 50% = 9%
Poole Study[16]	73	80-84	Mild, moderate or severe systolic dysfunction (by qualitative assessment)= 12%
UK ECHOES Study[17]	66	85+	EF 50% or less = 17%; EF less than 40% = 3%
Rotterdam Study[18]	29	85-94	EF 42.5% or less = 10%

DIASTOLIC DYSFUNCTION

Study	number in older age group	age range (years)	Findings
Newcastle 85+ Study	376	87-89	Mild/moderate/severe diastolic dysfunction = 88%; moderate/severe dysfunction = 31%; isolated mild/moderate/severe dysfunction = 61%; isolated moderate/severe dysfunction = 20%
Predictor Study	713	75-84	Mild/moderate/severe diastolic dysfunction: men=64%, women=59%; moderate/severe dysfunction: men=11%, women=7%
Belfrail Study	458	80+	Isolated mild, moderate, severe diastolic dysfunction 51%; isolated severe diastolic dysfunction 3%
Jerusalem Study	450	85	Severe diastolic dysfunction = 20%
Olmsted County Study	298	75+	Mild/moderate/severe diastolic dysfunction = 71%; moderate/severe dysfunction = 18%
Canberra Heart Study[19]	118	80-86	Mild/moderate/severe diastolic dysfunction = 64%; moderate/severe dysfunction = 14%; isolated mild/moderate/severe diastolic dysfunction = 47%; isolated moderate/severe dysfunction = 11%.
Asturias Study[20]	20	80+	Mild/moderate/severe diastolic dysfunction = 78%

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