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Title

Mortality and Quality of Life in Elderly Patients on Dialysis in New Zealand: Results from the Dialysis Outcomes in the ≥ 65 s Study (DOS65+)

Location

Dunedin School of Medicine, University of Otago, Dunedin, New Zealand

Authors

1. G.M.E Pearson (elective student)
2. R.J Walker (elective supervisor)

Introduction

The population of New Zealand (NZ) is ageing, with the ≥ 65 s projected to account for almost one third of the population by 2068¹. Ever increasing life expectancy coupled with age-related decline in kidney function means the incidence of end-stage renal failure (ESRF) in the ≥ 65 s continues to rise. With changes in public expectations and advances in healthcare technology, renal replacement therapies (RRT) are now widely available to elderly patients, who were previously considered ineligible. It is unsurprising, therefore, that ≥ 65 s now represent 50% of the prevalent dialysis population in NZ².

In accordance with the Renal Physicians Association's recommendation³, nephrologists and elderly patients are sharing complex decisions regarding ESRF management. To facilitate these decisions patients need information on the prognosis and quality of life (QoL) associated with all available options, however the data to support this is lacking. Moreover, the Dialysis Outcomes and Practice Patterns Study (DOPPS) found that there are marked differences in dialysis mortality between countries due to demographic and practice differences⁴, highlighting the need for data specific to the NZ population.

Unsurprisingly, mortality on dialysis increases with age in NZ², following the global trend: DOPPS reported that mortality risk increases by 4% with each year of age, and patients ≥ 65 have twice the risk of death compared to those < 65 ⁴. However, survival rates in the elderly are improving: in NZ 1 year survival for patients ≥ 65 starting dialysis improved from 73% in 2009⁵ to 84% in 2015². The most recent data tells us that elderly dialysis patients can expect to live up to 3 years from the start of dialysis^{2,6-8}.

There is clear evidence that elderly patients with limited life expectancy value QoL over quantity of life⁹, however evidence of this nature is more limited than survival data. What we do know is that elderly adults on dialysis consistently have a worse QoL than the general population of elderly adults, and than younger patients on dialysis^{6,10-13}. Given that there is ample proof that low QoL is predictive of morbidity and mortality on dialysis¹²⁻¹⁴, it is of pressing importance to further investigate QoL on dialysis so that interventions can be put in place to improve both QoL and survival outcomes.

Haemodialysis (HD) is considered the default RRT for the elderly in most countries; elderly patients are 6 times more likely to be on HD than younger dialysis patients¹⁵. However many argue that peritoneal dialysis (PD) would better preserve QoL given that it can be self-administered at home, whereas HD generally requires regular, disruptive travel to hospital^{16,17}. Notwithstanding the evidence that there is no difference in survival or QoL outcomes between PD and HD in elderly patients^{10,18}, 50% of elderly patients express a preference for PD when given adequate pre-dialysis education and multi-disciplinary support¹⁵, highlighting the importance of patient education and involvement in decision-making.

Conservative kidney management (CKM) is another emerging field of treatment in ESRF which focusses on symptom relief without dialysis. There has been an explosion of research in this area, and meta-analysis of this data shows that elderly ESRF patients managed conservatively can expect to live anywhere between 6-35 months¹⁹. Whilst dialysis does offer a survival advantage, this is significantly reduced in elderly patients with multiple co-

morbidities²⁰⁻²². Moreover, conservatively-managed patients spend less time in hospital and are more likely to die at home⁸. All things considered, it is essential that CKM is offered to elderly patients with ESRF, as for many the burden of dialysis may outweigh the benefits.

Aims & Objectives

The Dialysis Outcomes in those ≥ 65 Study (DOS65+) is a 3-year prospective longitudinal cohort study which aims to provide key information on QoL and mortality in elderly patients with ESRF in NZ. This cross-sectional analysis aims to:

- a) Evaluate mortality and QoL outcomes on 3 different treatment modalities: HD, PD and non-dialytic care.
- b) Assess for independent predictors of mortality and low QoL in ESRF.
- c) Assess for an association between low QoL and mortality on dialysis.

The objectives were to:

- a) Perform a literature review of the evidence around QoL in elderly patients on dialysis, and the links to mortality.
- b) Search the literature for validation studies of the SF-36 tool in elderly, dialysis and New Zealand populations.
- c) Analyze the baseline and 2-year data on QoL and mortality, assessing for significant differences between demographic groups.

Methods

Study Design

The DOS65+ study protocol has been published previously²³. Incident and prevalent dialysis patients ≥ 65 years old were recruited from 3 District health Boards across New Zealand, resulting in a final cohort of 225 participants.

Participants were invited to baseline interview, and subsequent interviews were scheduled for 12, 34 and 36 months. Explanatory variables were collected at interview (unpublished 12-month outcome paper) and have been grouped into demographic, socioeconomic, health, RRT-related and ESRF-related.

Clinical information was collected, with participants' consent, from their health records at the time of recruitment and throughout follow-up. Treatment modality, vintage and location (home or in-centre) were ascertained at interview. The group undergoing 'non-dialytic care' was composed of those deemed eligible for dialysis but who elected to follow a conservative pathway or chose to wait before starting dialysis.

Short-Form 36

QoL was assessed in interviews using the short-form 36 (SF-36) questionnaire. This tool was chosen as it has been validated and used extensively in research on elderly, RRT and NZ populations²⁴⁻²⁶.

The 36 items from this questionnaire are grouped into 8 domains: physical function (PF), role limitation due to physical function (RP), bodily pain (BP), general health (GH), vitality (VT), social function (SF), role limitation due to emotional function (RE) and mental health (MH). Once the dimensions of the SF-36 were scored according to its authors' recommendations²⁷, we used scoring coefficients derived from the NZ general population to generate the component summary scores²⁶. The physical component summary (PCS) and mental component summary (MCS) scores range from 0-100, with higher scores indicating better QoL.

Results

Baseline characteristics

Table 1: Characteristics of the cohort at baseline interview, divided into demographics, socioeconomic, health, RRT-related and ESRF-related characteristics.

Baseline characteristics	N (%)
<i>Total</i>	225
Demographics	
<i>Age (years)</i>	
65-69	85 (38)
70-74	65 (29)
75-79	45 (20)
80+	30 (13)
<i>Sex</i>	
Male	144 (64)
Female	81 (36)
<i>Ethnicity</i>	
NZ-European	96 (43)
Māori	50 (22)
Pacific	50 (22)
Other	29 (13)
Socioeconomic	
<i>Living arrangements</i>	
Living with others	192 (85)
Living alone	33 (15)
<i>Household income</i>	
Adequate	103 (46)
Inadequate	121 (54)
Missing	1
<i>Satisfaction with social relationships</i>	
Satisfied	203 (91)
Not satisfied	21 (9)
Missing	1
<i>Family involvement</i>	
Large	201 (89)
Small	24 (11)
<i>Sense of community</i>	
Strong	96 (43)
Little	129 (57)
Health	
<i>Number of co-morbidities</i>	
0-2	104 (46)
3-6	121 (54)
<i>Self-rated overall health</i>	
Excellent/Very good	82 (36)
Good	88 (39)

Fair/Poor	55 (24)
RRT-related	
<i>Dialysis vintage (years)</i>	
0 (non-dialysis)	51 (23)
>0-2	93 (41)
>2-4	30 (13)
>4-6	23 (10)
>6	28 (12)
<i>Modality</i>	
HD	109 (48)
PD	60 (27)
Non-dialytic care	56 (25)
<i>Location of care</i>	
In-centre (HD)	98 (44)
Home (HD/PD)	71 (32)
Non-dialytic care	56 (25)
ESRF-related	
<i>Kidney symptom score</i>	
0-30	153 (68)
31+	72 (32)

Mortality

Table 2: Numbers surviving at 2 years, presented as a percentage of the original baseline cohort. Statistical analysis was done on 2-year data to detect significant differences in percentage mortality within characteristic groups.

Characteristics	Numbers survived (% baseline)		
	Baseline	2 years	P value
Total	225	155 (69)	
Demographics			
<i>Age (years)</i>			
65-69	85	70 (82)	0.01
70-74	65	38 (58)	
75-79	45	27 (60)	
80+	30	20 (67)	
<i>Sex</i>			
Male	144	96 (67)	0.34
Female	81	59 (73)	
<i>Ethnicity</i>			
NZ-European	96	63 (66)	0.82
Māori	50	36 (72)	
Pacific	50	36 (72)	
Other	29	20 (69)	
Socioeconomic			
<i>Living arrangements</i>			

Living with others	192	134 (70)	0.48
Living alone	33	21 (64)	
<i>Household income</i>			
Adequate	103	69 (67)	0.60
Inadequate	121	85 (70)	
Missing	1	1	1
<i>Satisfaction with social relationships</i>			
Satisfied	203	140 (69)	0.83
Not satisfied	21	14 (67)	
Missing	1	1	1
<i>Family involvement</i>			
Large	201	143 (71)	0.03
Small	24	12 (50)	
<i>Sense of community</i>			
Strong	96	70 (73)	0.26
Little	129	85 (66)	
Health			
<i>Number of co-morbidities</i>			
0-2	104	77 (74)	0.12
3-6	121	78 (64)	
<i>Self-rated overall health</i>			
Excellent/Very good	82	58 (71)	0.63
Good	88	62 (71)	
Fair/Poor	55	35 (64)	
RRT-related			
<i>Dialysis vintage (years)</i>			
0 (non-dialysis)	51	38 (75)	0.05
>0-2	93	67 (72)	
>2-4	30	16 (53)	
>4-6	23	19 (83)	
>6	28	15 (54)	
<i>Modality</i>			
HD	109	74 (68)	0.48
PD	60	39 (65)	
Non-dialytic care	56	42 (75)	
<i>Location of care</i>			
In-centre (HD)	98	66 (67)	0.52
Home (HD/PD)	71	47 (66)	
Non-dialytic care	56	42 (75)	
ESRF-related			
<i>Kidney symptom score</i>			
0-30	153	111 (73)	0.08
31+	72	44 (61)	

Quality of Life

Table 2: The mean physical component summary (PCS) and mental component summary (MCS) scores at baseline and 2 years. Statistical analysis was performed at both time points to detect any significant differences in QoL within characteristic groups.

Characteristics	Baseline				2 year			
	Mean PCS	P value	Mean MCS	P value	Mean PCS	P value	Mean MCS	P value
Demographics								
<i>Age (years)</i>								
65-69	39.3	0.22	28.8	0.11	36.8	0.35	28.5	0.64
70-74	36.2		25.1		33.5		25.1	
75-79	37.9		30.4		32.8		28.6	
80+	36.9		31.2		35.5		24.8	
<i>Sex</i>								
Male	38.5	0.13	28.4	0.96	35.9	0.28	25.1	0.03
Female	36.5		28.3		33.7		31.0	
<i>Ethnicity</i>								
NZ-European	36.8	0.03	27.3	0.39	34.2	0.54	26.5	0.72
Māori	36.1		29.2		34.0		30.0	
Pacific	39.3		27.3		36.7		26.7	
Other	41.8		32.2		37.8		25.9	
Socioeconomic								
<i>Living arrangements</i>								
Living with others	38.1	0.20	29.2	0.03	35.0	0.89	26.4	0.06
Living alone	35.8		23.3		35.4		33.7	
<i>Household income</i>								
Adequate	38.8	0.20	31.9	<0.01	35.6	0.59	28.9	0.30
Inadequate	36.8		25.4		34.6		26.0	
Missing	45.8	14.3	-	-	-	-	-	-
<i>Satisfaction with social relationships</i>								
Satisfied	37.8	0.83	28.8	0.11	34.9	0.71	27.5	0.67
Not Satisfied	37.4		23.7		36.2		25.5	
Missing	-	-	-	-	-	-	34.3	34.2
<i>Family involvement</i>								
Large	38.1	0.16	29.0	0.05	35.3	0.34	28.0	0.0?
Small	35.3		22.8		31.6		17.0	
<i>Sense of community</i>								
Strong	40.0	<0.01	30.5	0.05	36.2	0.29	30.4	0.03
Little	36.1		26.7		34.1		24.7	
Health								
<i>Number of co-morbidities</i>								
0-2	40.0	<0.01	30.5	0.03	38.1	<0.01	28.8	0.21
3-6	35.8		26.5		31.6		25.5	
<i>Self-rated overall health</i>								

Excellent/Very good	41.5	<0.01	32.7	<0.01	39.2	<0.01	31.1	0.05
Good	38.4		28.4		34.4		27.0	
Fair/Poor	31.2		21.6		30.9		22.8	
RRT-related								
<i>Dialysis vintage (years)</i>								
0 (non-dialysis)	38.1	0.50	30.0	0.70	35.2	0.97	28.5	0.54
>0-2	36.9		26.7		34.7		27.4	
>2-4	39.7		29.1		36.6		28.1	
>4-6	39.4		28.3		34.4		21.6	
>6	36.6		30.0		34.8		29.9	
<i>Modality</i>								
HD	37.9	0.96	28.2	0.84	36.1	0.41	27.5	0.83
PD	37.5		27.8		32.9		25.9	
Non-dialytic care	37.7		29.3		35.2		28.1	
<i>Location of care</i>								
In-centre (HD)	37.7	0.99	28.0	0.85	35.8	0.74	27.7	0.81
Home (HD/PD)	37.9		28.0		34.0		26.0	
Non-dialytic care	37.7		29.3		35.2		28.1	
ESRF-related								
<i>Kidney symptom score</i>								
0-30	39.5	<0.01	32.0	<0.01	36.4	0.03	28.4	0.18
31+	34.1		20.6		31.9		24.6	

Conclusion

We found that mortality nor QoL vary with dialysis vintage, modality or location of treatment, whereas high burdens of co-morbidities and ESRF-related symptoms were associated with reduced QoL. Increasing age was found to be associated with mortality, however there was no correlation between age and QoL on dialysis. Contrary to previous studies on other diseases, we have shown no significant differences in mortality or QoL in ESRF between the various ethnicities in NZ. Interestingly, socioeconomic factors including living with others, family involvement and sense of community contribute significantly to QoL in our patients, and lack of family involvement was also significantly related to mortality.

These findings are consistent with the growing body of evidence around dialysis outcomes in the elderly, highlighting several key variables contributing to survival and QoL on dialysis which should be considered by doctors and patients when making decisions about the management of ESRF.

Reflection

I have long wanted to pursue a career in academic medicine, and during my clinical years I enjoyed the challenging complexity of geriatric medicine. This research project has allowed me to explore my interest in academic geriatrics, and the presentation and publication of my work will strengthen my applications for academic clinical fellowships and postdoctoral training in this area. This project has also allowed me to expand my experience of clinical research and data analysis - both skills which will stand me in good stead for a future career in academic geriatrics.

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Including: Title, Location, Authors, Introduction, Aims & Objectives, Methods, Results (table headings), Conclusion and Reflection.

Not Including: Table of contents, Results tables, Acknowledgements, List of Abbreviations and References

List of Abbreviations

NZ: New Zealand

ESRF: End-stage renal failure

RRT: Renal replacement therapy

QoL: Quality of life

DOPPS: Dialysis outcomes and practice patterns study

HD: Haemodialysis

PD: Peritoneal dialysis

CKM: Conservative kidney management

DOS65+: Dialysis Outcomes in the ≥ 65 s Study

SF-36: Short form 36

PF: Physical functioning

RP: Role limitation due to physical function

BP: Bodily pain

GH: General health

VT: Vitality

SF: Social functioning

RE: Role limitation due to emotional function

MH: Mental Health

PCS: Physical component summary

MCS: Mental component summary

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