Self-reported physical function predicts all cause mortality in patients with chronic kidney disease.

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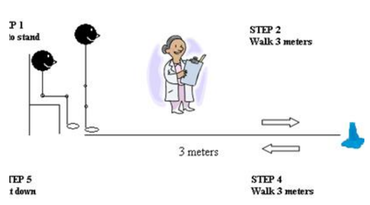
Introduction

- Patients with chronic kidney disease (CKD) not requiring renal replacement therapy (RRT) exhibit 30-55% worse physical function than expected based on normative data.
- Reduced physical function is associated with increased risk of morality.
- Routine physical performance measures e.g. gait speed and timed up and go tests can help to identify those at risk for adverse outcomes.



- However, objective measures are not always feasible, and self-reported measures may provide a suitable surrogate.

Aims

- The aim of this study was to investigate if self-reported physical function was associated with survival in CKD patients not requiring RRT**.**

Methods

- Participants were non-dialysis CKD stages 1-5, recruited from an outpatient clinic in the U.K between September 2012 and June 2013.
- Upon enrolments participants completed the Duke Activity Status Index (DASI), a validated questionnaire to assess functional capacity.
- In the DASI, each activity of daily living is weighted with a Metabolic Equivalent of Task value, which are then summed to produce a DASI score between 0-58.2.
- Higher scores indicate better physical function.
- Mortality was recorded from electronic patient records in September 2016.

Figure 1: Consort diagram to show participant flow through study

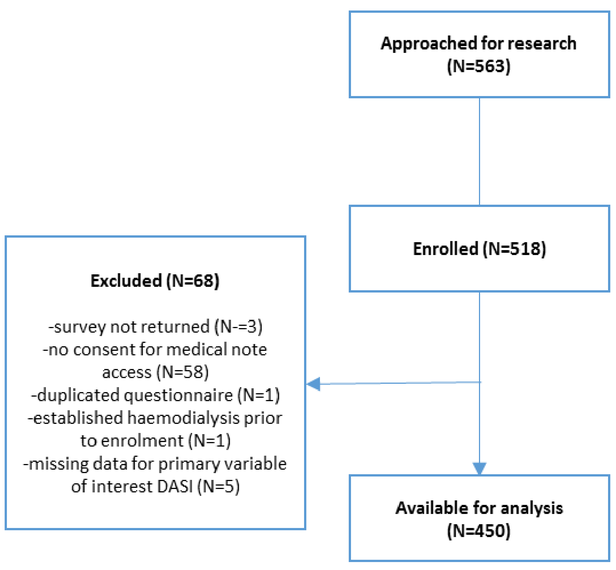
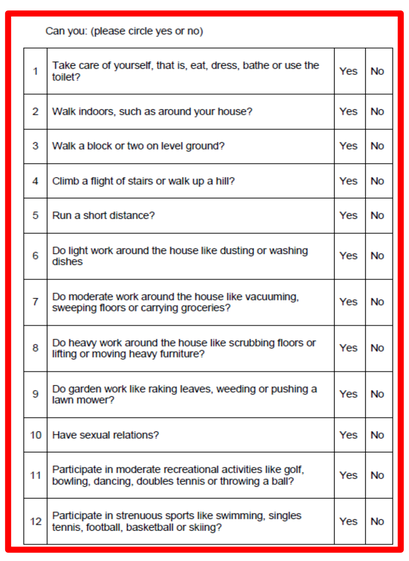


Figure 2: Duke Activity Status Index



Can you: (please circle yes or no)

1	Take care of yourself, that is, eat, dress, bathe or use the toilet?	Yes	No
2	Walk indoors, such as around your house?	Yes	No
3	Walk a block or two on level ground?	Yes	No
4	Climb a flight of stairs or walk up a hill?	Yes	No
5	Run a short distance?	Yes	No
6	Do light work around the house like dusting or washing dishes	Yes	No
7	Do moderate work around the house like vacuuming, sweeping floors or carrying groceries?	Yes	No
8	Do heavy work around the house like scrubbing floors or lifting or moving heavy furniture?	Yes	No
9	Do garden work like raking leaves, weeding or pushing a lawn mower?	Yes	No
10	Have sexual relations?	Yes	No
11	Participate in moderate recreational activities like golf, bowling, dancing, doubles tennis or throwing a ball?	Yes	No
12	Participate in strenuous sports like swimming, singles tennis, football, basketball or skiing?	Yes	No

Statistical Analysis

- A receiver operating curve was constructed to plot DASI scores as a binary classifier to identify a cut off score to predict mortality.
- Kaplan-Meier survival curves and log-rank tests were used to examine estimated survival proportions.
- Cox proportional hazard models were constructed to examine associations between physical function (DASI) and mortality. Models were adjusted for age, gender, eGFR, haemoglobin, diabetes mellitus, hypertension and ischemic heart disease.
- Sensitivity analyses: 1) examined all-cause mortality after excluding patients with an eGFR>60 ml/min/1.73m^2; 2) examined all-cause mortality after excluding patients who died within the first 6 months after enrolment to the study.

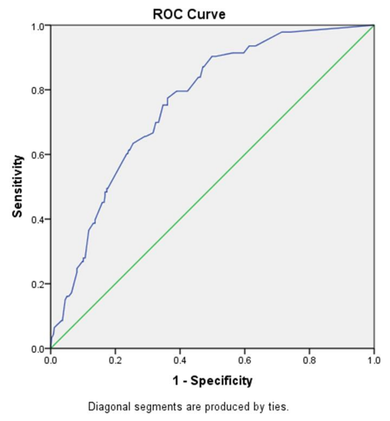
Results

- Participants (N=450) were followed up for a median (IQR) of 44 months (42-45).
- There were 93 deaths (20.4%) during this follow up period.
- Of the remaining 357 participants, none were lost to follow up.
- Missing data for all variables of interest were <5%.

Table 1: Participant characteristics

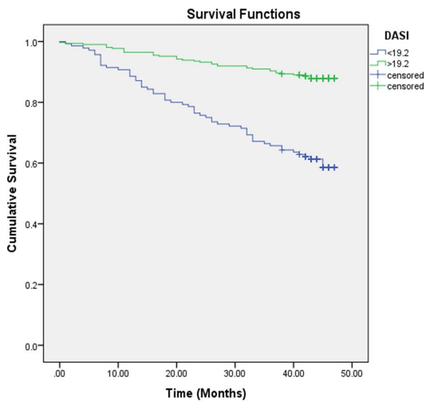
Characteristic	Total N=450	Survival N=362	Non-survival N=93
Age (years),	62(48-75)	58(45-71)	77(59-81)
Gender [male, %)	258 (57.3)	199 (55.0)	62 (66.7)
Ethnicity [white, %)	360 (80.0)	277 (76.5)	86 (92.5)
eGFR (ml/min/1.73^2)	29 (35.5)	33(44.50)	21(16)
Haemoglobin (g/L)	122 (108-135)	125(112-136)	112(100-124)
Diabetes (n, %)	121(26.9)	86 (24.1)	35 (37.6)
Hypertension (n, %)	247(54.9)	191(53.5)	56(60.2)
Ischemic Heart disease (n, %)	82(18.2)	46 (12.9)	36(38.7)
DASI summed METs	35.7 (18.95-50.70)	40.2 (21.11-58.20)	18.95 (10.35-29.83)

Figure 3: ROC curve to predict all-cause mortality by DASI score



DASI score 19.2 predicted mortality with 60% sensitivity and 77% specificity (area under curve 0.76; CI 95% 0.71-0.81; p <0.001).

Figure 4: DASI cut off points of 19.2 summed METs survival estimates.



Survival proportions were higher among participants classified above the DASI cut off of 19.2 when compared to participants classified below this point (87.9% vs 58.6) (P<0.001).

Table 2: Cox proportional hazard analysis for all-cause mortality

Measures	Crude HR (95% CI)	P-Value	Adjusted HR (95%, CI)	P-Value
DASI (0-58.2)	0.95 (0.94-0.97)	<0.001	0.98 (0.96-0.99)	0.004
DASI (>19.2 summed METs)	0.25, (0.17-0.38)	<0.001	0.56 (0.34-0.90)	0.02

Sensitivity analyses: Results remained stable for both sensitivity analyses.

Conclusion

- A DASI score >19.2 was independently associated with a reduced risk (44%) of all cause mortality.
- DASI may be a useful prognostic score when used alongside clinical markers for identifying patients at risk for adverse events, and could easily be integrated into routine care.
- Physical function has been shown to be modifiable through appropriate targeted exercise.
- However, it remains unclear from this work and the current literature if increasing physical function via intervention would be associated with better rates of survival in CKD patients not RRT.

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