Articles
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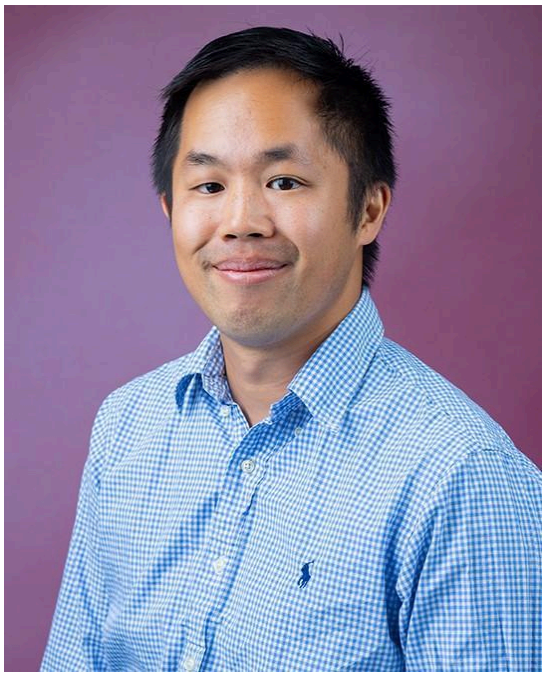
🧵 Tweetorial Alert 🧵

1/
Hey #NephTwitter!
Welcome to a 🆕 #tweetorial #xtorial brought to you by @KIReports.

2/
Our author is Melvin @MChanMD (pediatric nephrologist)
Our topic: Kidney Function Trajectories with Mechanical Circulatory Support

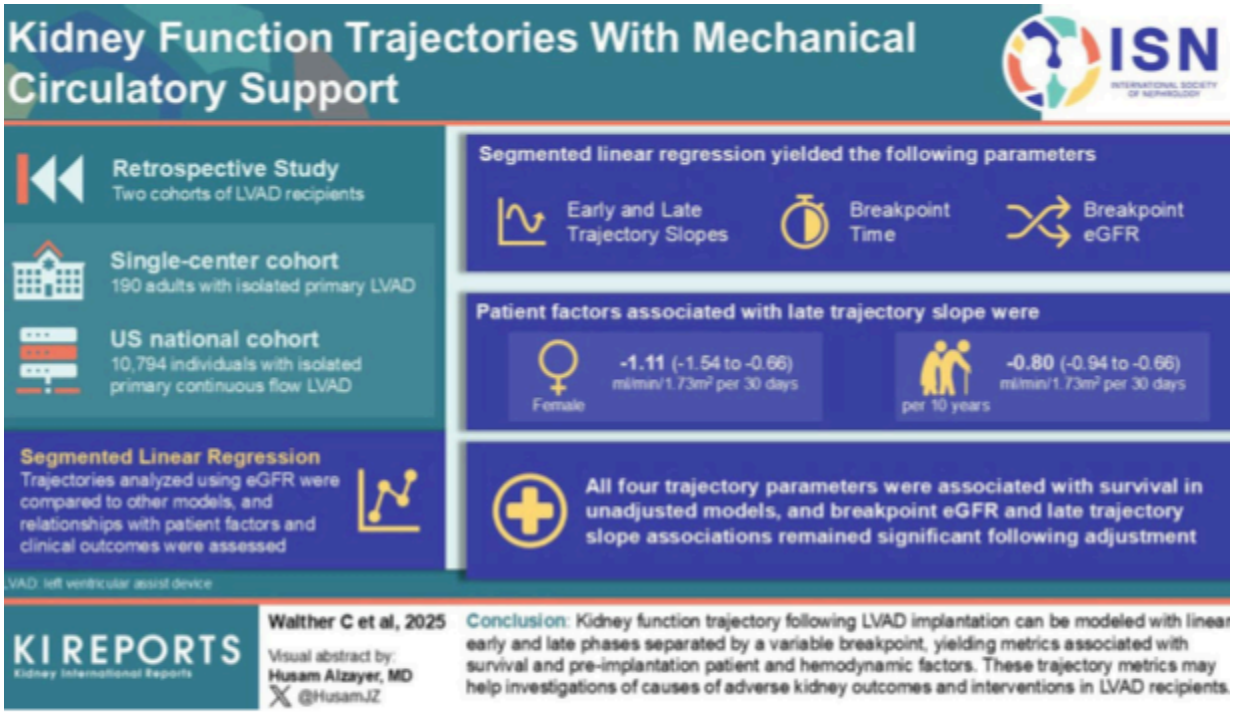
#MedTwitter #nephtwitter @ISNkidneycare #XTwitter



3/
There are no conflicts of interest. Please also check out #KIReportsCommunity educational #blogposts at https://www.kireportscommunity.org/. FOLLOW US at @KIReports for more expert #MedEd in #kidneydisease. #FOAMed @MedTweetorials

4/ Our #Tweetorial is based on a recent publication by Dr. Carl Waltherand VA by @husamjz.bsky.social:
Kidney Function Trajectories with Mechanical Circulatory Support

🗞️ https://www.kireports.org/article/S2468-0249%2825%2900478-4/fulltext



Caption

5/ Intro
💡Increasing use of mechanical circulatory support (MCS) like, ie LVADs
💡Average time on MCS is 20 months
💡Mean survival has increased to 5 years

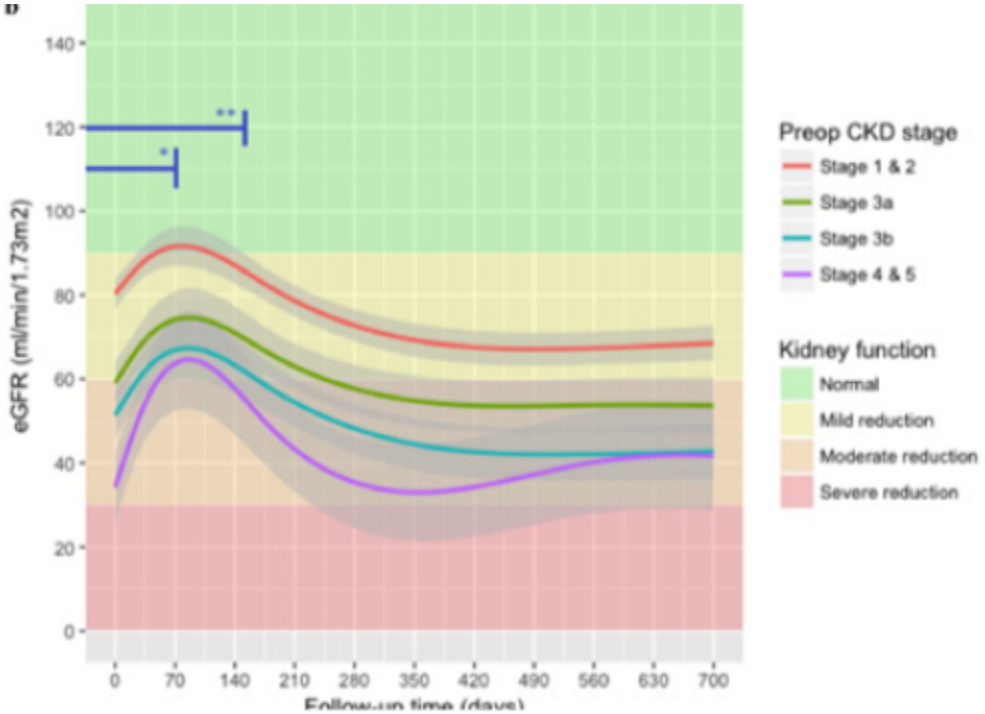
PMID: 30691593

6/ Intro

💡 Most common kidney trajectory is an early improvement followed by sustained decline as seen in prior #NephMadness

💡 Identifying risk factors for poor renal outcomes have been challenging due to confounders

🔊https://ajkdblog.org/2023/03/01/nephmadness-2023-heart-failure-devices-region/



Caption

7/ There is great need for ways to predict kidney trajectory in MCS patients as highlighted by a recent statement from @americanheart.bsky.social statement. We hope this manuscript sheds some 🔦!

8/ Methods

Cohort 🥇: Single-Center with MCS placement from 2019-2023, which provided more creatinine data

Cohort 🥈: Multicenter Registry (Interagency Registry for Mechanically Assisted Circulatory Support [INTERMACS]) with MCS placement from 2012-2017, which provided more participants

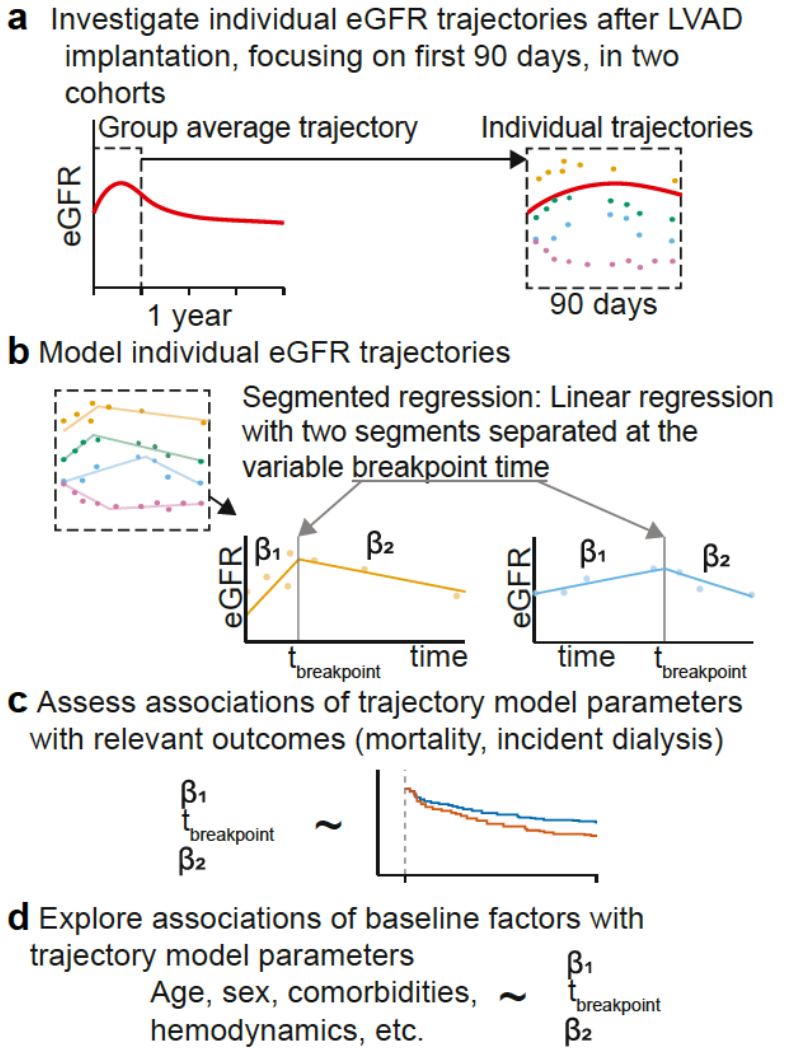


Figure 1. Summary illustration of the investigation of parameterization and relevance of individual kidney function trajectories after LVAD implantation. eGFR, estimated glomrulrular filtration rate; LVAD, left ventricular assist device.

9/ Methods

Inclusion

✅ Patients who survived past 90 days after MCS placement

Exclusion

❌ Transplant recipients

❌ Device Exchange/Explantation

❌ Those missing pre-operative; 1-week; 1-month; and 3-month post placement creatinine data

10/ Measurements

📏 Kidney Function: Using CKD-Epi 2021 based on creatinine. If on dialysis, eGFR presumed to be less than 10mL/min/1.73m2

📏 Early trajectory slope

📏 Late trajectory slope

📏 Breakpoint time (defined as when early positive slope transitions to late negative slope)

📏 Breakpoint eGFR

11/ Statistics

📐Segmental regression as compared to logarithmic and linear models

12/ Clinical Characteristics

📌Single center had 190 patients

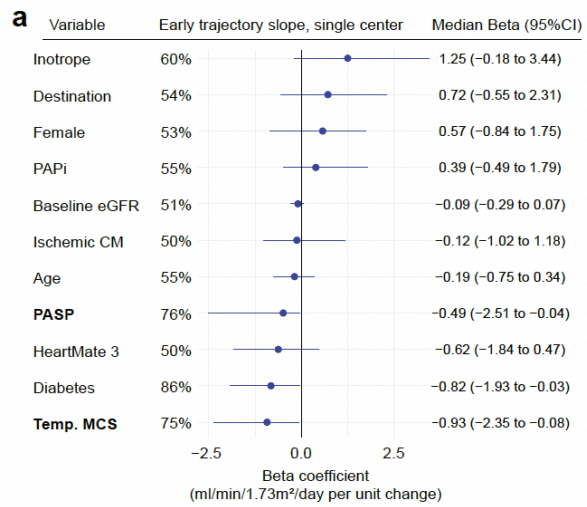
📌Multicenter had 10794 patients

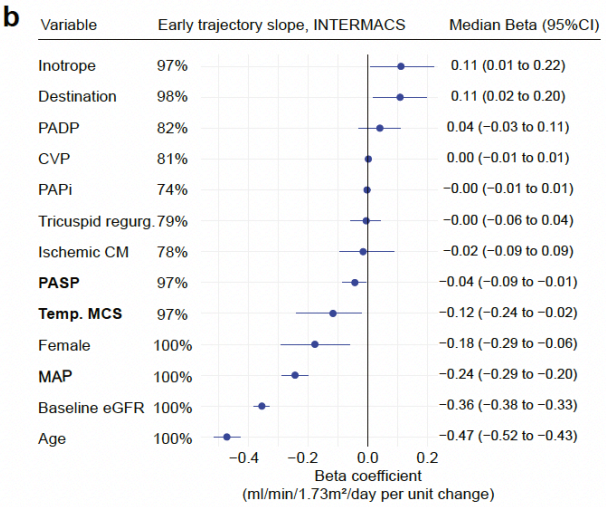
📌Similar cohorts except multi-center had more MCS placement due to acute decompensation and both used different device types

Table 1. Baseline characteristics for the single-center and INTERMACS cohorts

Characteristics	Single center (n = 190)	INTERMACS (n = 10,794)
Demographics		
Age, yrs	59 (49–66)	59 (49–66)
Female	40 (21.1%)	2251 (20.9%)
Race		
White	99 (52.1%)	7032 (65.1%)
Black	81 (42.6%)	2756 (25.5%)
Asian	4 (2.1%)	164 (1.5%)
Other or Unknown	6 (3.2%)	842 (7.8%)
Hispanic ethnicity	32 (16.8%)	721 (6.7%)
Device strategy		
Destination therapy	170 (89.5%)	5042 (46.7%)
Bridge to transplant	14 (7.4%)	2753 (25.5%)

13/ Modifiers of Early Trajectory Slope
☝ Single Center: Diabetes
☝ Multicenter: Older age, female sex, higher baseline eGFR, higher MAP, destination therapy, pre-operative inotrope/vasopressor use
☝ Both Cohorts: Need for temporary MCS and pulmonary arterial systolic pressures

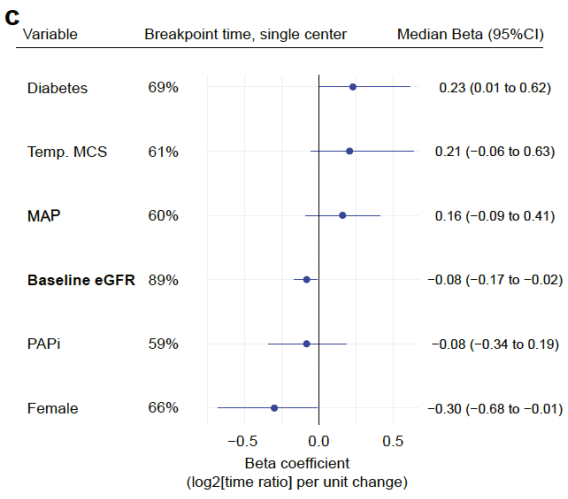


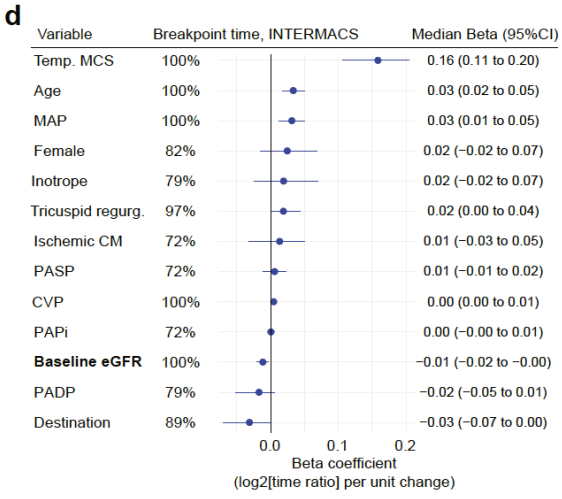


14/ Modifiers of Breakpoint Time

☝ Single Center: Diabetes, female sex

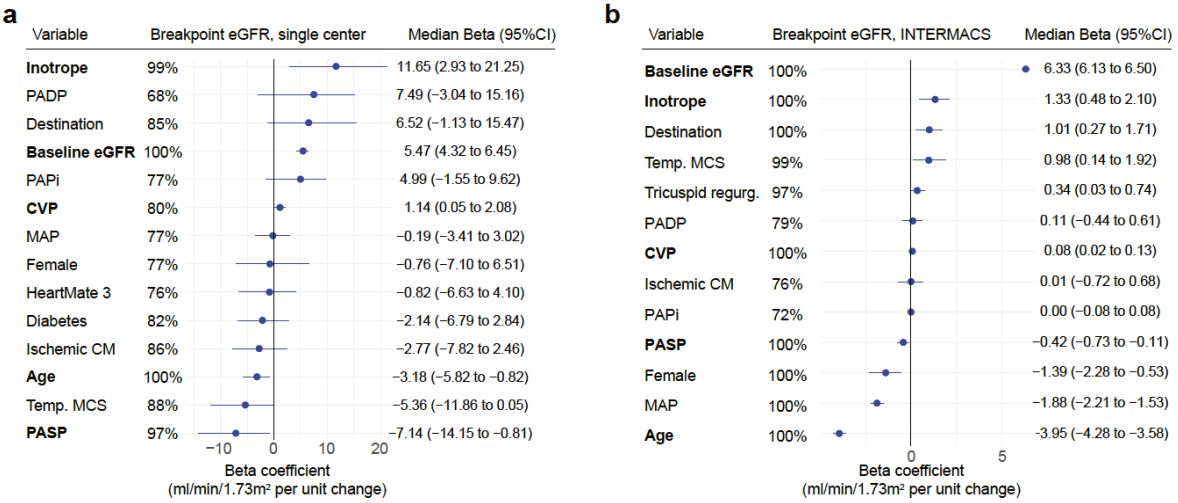
☝ Multicenter: Need for temporary MCS, older age, and higher MAP





15/ Modifiers of Breakpoint eGFR

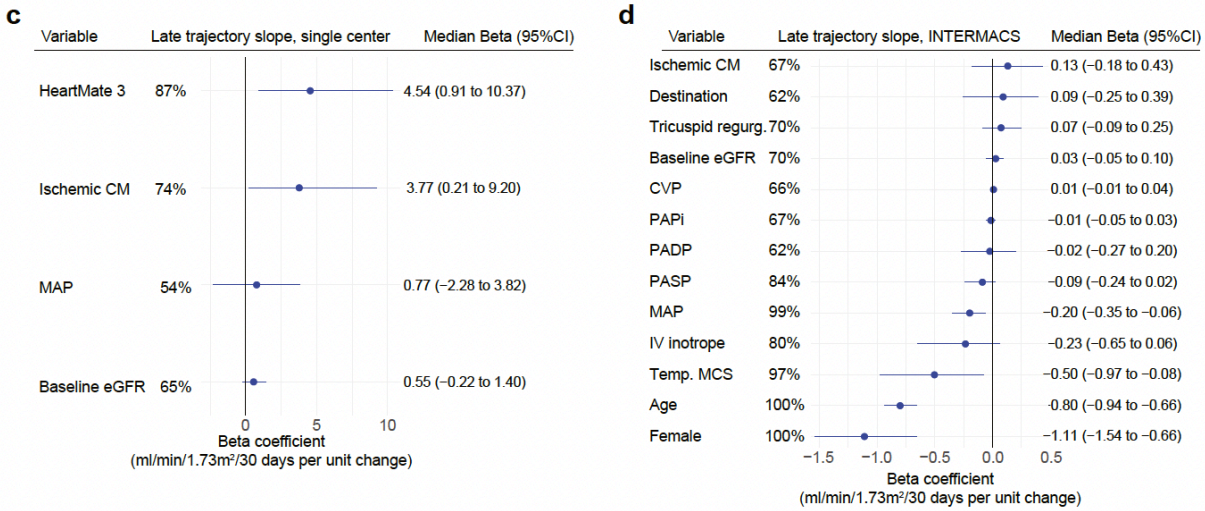
☝ Both Cohorts: Baseline eGFR, pre-operative inotrope/vasopressor use, central venous pressures, older age, pulmonary artery systolic pressures



16/ Modifiers of Late Trajectory Slope

☝ Single Center: HeartMate3, ischemic cardiomyopathy

☝ Multicenter: Female sex, older age, need for temporary MCS, mean arterial pressure



17/ Modifiers of 🌭 and Dialysis in Multicenter Registry

☝ Unadjusted Models for 🌭: Early trajectory slope, breakpoint time, breakpoint eGFR, late trajectory slope

☝ Adjusted Models for 🌭: Breakpoint eGFR, late trajectory slope

☝ No modifiers identified in unadjusted or adjusted models for dialysis

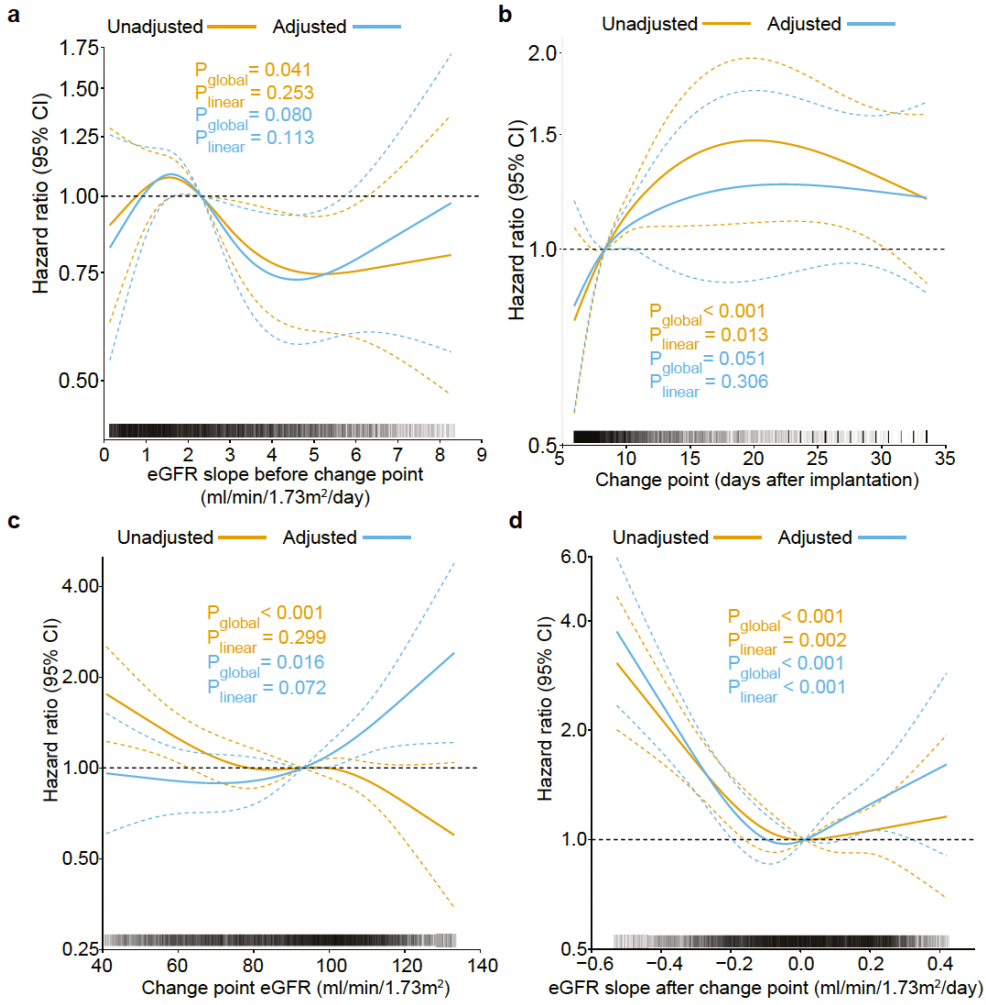


Figure 7. Relationships of trajectory parameters with risk of death over up to 12 months following LVAD implantation in the INTERMACS positive early trajectory subcohort. (a) Early trajectory slope. (b) Breakpoint (days after implantation). (c) Breakpoint eGFR. (d) Late trajectory slope. Restricted cubic spline Cox proportional hazards analysis with 4 knots was used for the middle 95% of trajectory variable values. Reference points are at the medians. Dotted lines show 95% CIs. Individuals with negative early trajectory slope were excluded to reduce influence of early surgical complications. Trajectory parameters were calculated using segmented regression and $eGFR_{creatinine}$ values from preimplantation to 3 months postimplantation. Late trajectory slope was adjusted for early trajectory slope and breakpoint eGFR. Individuals were censored at heart transplant or device exchange or explantation. Covariates (all preoperative) were age, sex, baseline eGFR, INTERMACS profile 1 or 2 versus 3 or higher, temporary mechanical circulatory support, i.v. inotrope use, destination therapy, ischemic cardiomyopathy, INTERMACS-defined severe diabetes, and INTERMACS-defined CKD. CI, confidence interval; CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate; INTERMACS, Interagency Registry for Mechanically Assisted Circulatory Support; LVAD, left ventricular assist device.

18/ Summary
🔑After MCS, patients had early rise in eGFR followed by decline
🔑This inflection point is around 1-2 weeks after placement
🔑Lower breakpoint eGFR and steeper eGFR decline in the late phase were risk factors of survival.
🔑Female sex and older age were modifiers of late trajectory slope

19/ Limitations
👎Utilizing only creatinine for eGFR determination rather than cystatin-c
👎Older generation of MCS used
👎Missing data

20/ Now let's see if you have learned something!

What were significant modifiers of needing dialysis?
1. Early slope
2. Late slope
3. Breakpoint time
4. Breakpoint eGFR
5. None

21/ The answer is 5. We hope this #tweetorial has improved your knowledge on the effects of MCS on kidney outcomes. Please share this #tweetorial with your followers and friends! Thanks to @MChanMD for authoring! @ISNkidneycare @KIReports