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Geriatric Nephrology

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CONTINUING MEDICAL EDUCATION
DEPARTMENT OF MEDICINE

HARVARD MEDICAL SCHOOL
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  - Research focus: Serious Illness Conversations, Integrated Renal-Palliative Care models

Disclosures

- Employment, Hebrew SeniorLife

Outline

- Geriatrics for Nephrologists
- CKD and Pre-ESRD care in the Aging Patient
- Conservative Management

Geriatric Assessment for the Nephrologist

- Multi-disciplinary assessment
  - Cognitive
  - Mobility/gait/balance
  - Functional dependence/independence
  - Symptoms – Pain, Depression, Continence
  - Family, social, financial, other support structures
  - Goals of Care and Advance Directive

Frailty

- Definition
  - Conceptual: decreased functional reserve
  - Fried definition (3 of 5):
    - ≥10lb weight loss/1 yr
    - Self-reported exhaustion
    - Grip strength weakness
    - Slow gait
    - Low physical activity
- Relevance
  - Highly prevalent in CKD (across age groups)
  - Associated with outcomes in HD patients
  - Not just an aging phenomenon in HD patients

Practical Application?

- Gait Speed
  - Associated with 5-year survival (Studenski JAMA 2011)
    - Consistent across speeds for every 0.1m/s
  - Associated with developing functional dependence (Van Kan JHNA 2009)
    - <1.0 m/s
- Waiting Room to Exam Room? (Fritz J Ger Phys Ther 2009)
- Time the “steady-state” walk
  - 20 ft; time the middle 10 ft
- Cutoff would be roughly10 ft in 3 seconds

Polypharmacy

- Definition can be variable
  - ≥5-10 medications
- Increased risk of side effects
- Increased risk drug-drug interactions
- Falls and other risks

The Four Questions: Geriatrics Approach

- Interpreting evidence/guidelines
  - Who – applicable/generalizable to my patient? multi-morbidity?
  - What – outcome of interest to my patient?
  - When - relevant time horizon?
  - Risks – what are the attendant risks?

Case Thread

- Mr Z. is an 82 year-old male 79 year old male in assisted living (there mainly due to his spouse's limitations) who is referred for CKD management
- He now has CKD stage 4, hypertension, and osteoarthritis
- His baseline creatinine rose to 2.4mg/dl (eGFR 24 ml/min/1.73m^2)
- Associated with some AKI episodes from poor oral intake while he was focused on caring for his wife with Alzheimer's disease

Geriatric Nephrology: Pre-ESRD

- Main question is access
- Risk/benefit
  - Avoidance of infection
  - Procedural risk and inconvenience
    - Primary vs secondary patency
      - Surgeon/patient dependent
      - Single center study: Over age 80 39% primary patency 92% secondary patency at 12 months
- Competing risk of death

Access for Elderly

- Who - Preemptive placement vs. after planned/acute catheter start
- What – Prevent infection, mortality?
- When – Timeframe to ESKD compared to life expectancy; Most catheter infections in 1st 6 months
- Risk – Never used, FTM, procedural complications

Pre-emptive access creation: A Framework

- NNT – Number needed to treat to prevent one access-related BSI
- Input life expectancy and access-specific infection rate to yield lifetime BSI rate for each access type
- Reciprocal of Absolute Risk Reduction (ARR)

Kurella-Tamura KI 2012

NNT for Access

- For individuals over 80 with average life expectancy for preemptive placement
  - AVF vs AVG – NNT 33
  - AVG vs CVC – NNT 2
  - Model 2- if start with CVC, AVF benefit minimal?
  - Model 3 – in those cases maybe AVG better?
  - Choosing Wisely?

Table 2 | Number needed to treat with preferred access type to prevent one episode of vascular access–related bacteremia due to non-preferred access

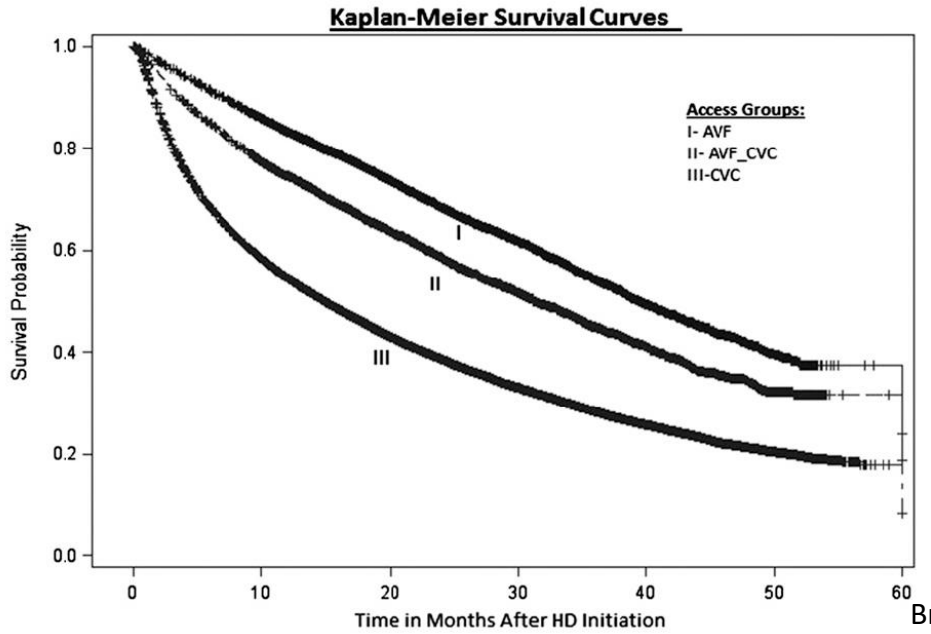
Treatment strategy to prevent bacteremia	65–69 years			70–74 years			75–79 years			80–84 years			85–89 years			⩾90 years		
	Quartiles of life expectancy																	
	75th	50th	25th	75th	50th	25th	75th	50th	25th	75th	50th	25th	75th	50th	25th	75th	50th	25th
AVF vs. AVG Model 1	9	17	48	10	20	62	11	25	82	14	33	110	18	47	167	24	67	219
AVF vs. AVG Model 2	27	—	—	35	—	—	62	—	—	—	—	—	—	—	—	—	—	—
AVG vs. CVC Model 1	<1	1	4	<1	1	5	<1	2	6	1	2	8	1	4	12	2	5	16
AVG vs. CVC Model 3	<1	1	4	<1	2	5	<1	2	7	1	3	9	1	4	15	2	5	21

Abbreviations: AVF, arteriovenous fistula; AVG, arteriovenous graft; CVC, central venous catheter.
'—' indicates life expectancy is shorter than time required to achieve benefit from intervention.
Model 1: Assumes both access types are functional at the start of dialysis.
Model 2: Assumes patients with AVF dialyze via CVC for 3 months while AVF matures and that patients with an AVG dialyze for 0.5 months with a CVC until the AVG is ready for use.
Model 3: Assumes patients with AVG dialyze via CVC for 0.5 months until the AVG is ready for use.

Kurella-Tamura KI 2012

Fistula First, Catheter Last: Benefit of Pre-ESRD Care?

- Large proportion of the AVF vs catheter benefit may be due to patient characteristics that lead to AVF placement in the first place
  - AVF-start mortality < Catheter-start due to immature/failed AVF <<< Catheter-start alone



Brown et al JASN 2016

Concurrent initiation and access creation: Cost Effective?

- Start dialysis with CVC; cost-effectiveness analysis of continue CVC alone, place AVF or AVG within 30 days
- AVF more cost effective than CVC for all except age 85-89 in lowest quartile of life expectancy
  - If life expectancy >2 years, AVF cost saving
  - If life expectancy <6 months, AVF and AVG not cost effective
- Many limitations, more nuanced

Table 4. Cost-effectiveness of AVF compared with CVC and AVG options by life expectancy quartile and age

Age, yr	AVF Options Versus CVC Options			AVF Options Versus AVG Options		
	75th Percentile	50th Percentile	25th Percentile	75th Percentile	50th Percentile	25th Percentile
65–69	Cost saving[a]	Cost saving	Cost saving	Cost saving	Cost saving	Cost saving
70–74	Cost saving	Cost saving	Cost saving	Cost saving	Cost saving	$3924/QALM
75–79	Cost saving	Cost saving	Cost saving	Cost saving	$2645/QALM	$2380/QALM
80–84	Cost saving	Cost saving	Cost saving	$2294/QALM	$2828/QALM	Cost saving
85–89	Cost saving	Cost saving	$14,042/QALM	$3860/QALM	Cost saving	$13,253/QALM

AVF, arteriovenous fistula; CVC, central venous catheter; AVG, arteriovenous graft; QALM, quality-adjusted life-month. Data shown are incremental cost-effectiveness ratios defined as difference in costs divided by difference in effectiveness (QALM). The incremental cost-effectiveness ratio represents the cost required to gain one additional QALM.
[a]Cost-savings is defined as a treatment option that has lower costs and greater effectiveness than the alternative treatment.

Hall CJASN 2017

Other Considerations

- Not just about infections, ESRD risk, and death
- QoL
  - Bathing
  - Pain of needle insertion
- Behavior
  - Pulling out catheter
  - Restless at HD with danger of needle dislodgement

Conclusion?

- Patient-centered, individualized decision
- Take into account:
  - Infection risk
  - life expectancy
  - likelihood of success of AVF
  - QoL
  - Behavioral and other issues

Case Thread Revisited

- Mr Z. is now 84 years old and has had a tough year. His wife passed away from Alzheimer's in April and in December he suffered a prolonged hospitalization for the flu that ultimately led him to be placed in a nursing home.
- He sees you for follow-up of CKD. He has lost 10lbs in past year. His creatinine is 2.9 mg/dl (eGFR 19 ml/min/1.73m^2), Alb 2.9 mg/dl.
- Na 138, Cl 96, Bicarb 17 (AG 25?).
- Medications metoprolol, amlodipine, furosemide, acetaminophen
- You decide to address his acidosis

Clinical Pearl

- Which of the following is the most appropriate next step in management?
  - A. Prescribe sodium bicarbonate 1300mg TID
  - B. No change in management
  - C. Add midodrine for BP support
  - D. Discontinue acetaminophen

Clinical Pearl Continued

- D. Discontinue acetaminophen

- This is AGMA from pyroglutamate or 5-oxoproline
- Depletion of glutathione from chronic acetaminophen use leads to accumulation of 5-oxoproline
- Associated with CKD and malnutrition
- Standing acetaminophen use becoming more common practice in nursing home setting for proactive pain management
- Patient-centered – maybe switch to prn?

Case Thread

- Mr Z. seems to be in a new steady-state and you decide it is a good time to talk about his thoughts regarding ESRD management
- You present dialysis and conservative management as viable options
- He asks what the difference in survival and quality of life might be

Conservative Management in ESRD

- Emerging interest in conservative management
  - Non-dialytic therapy
  - Is it more than just not dialysis?
  - Variously termed
    - Conservative Kidney Management (CKM)
    - Maximal Conservative Management (MCM)

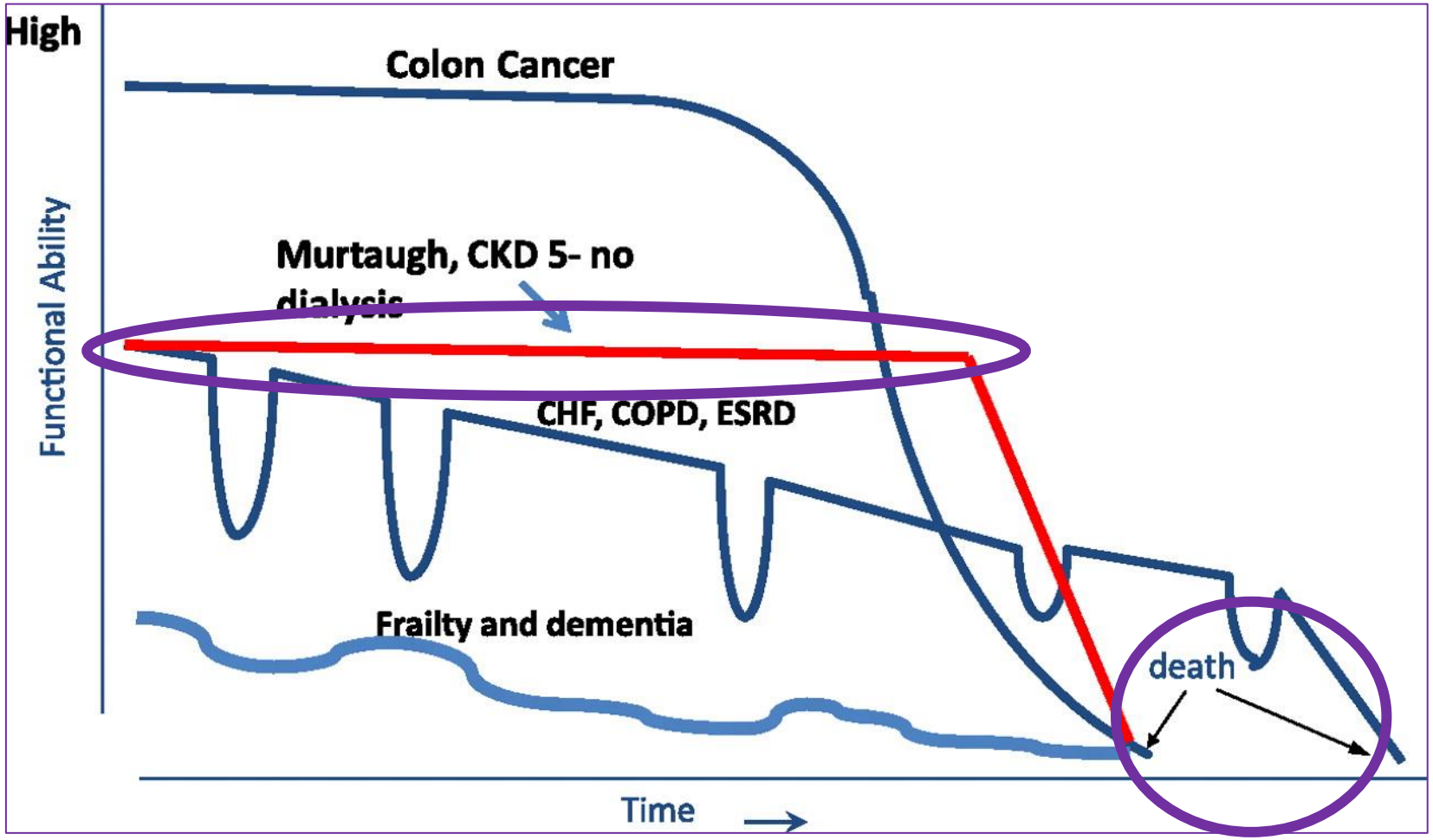
What is Conservative Management?

- Disease Management/Prevention of Progression
- Symptom Management
- Advance Care Planning/Communication

What is Conservative Management?

- CM includes management of:
  - Volume – diuretics, oxygen, other
  - Potassium – medication review, diet, other
  - Phosphate – diet, binders
  - Anemia – ESAs, Fe infusion (fatigue)
  - Pruritis – emollients, anti-histamines, dietary
  - Nausea – anti-emetics
  - Pain – taking into account renal clearance (APAP, hydromorphone, fentanyl; avoiding morphine, codeine)
  - RLS, muscle cramps - benzodiazepines
- All recommendations and decisions in context of patient goals and wishes

Illness trajectories.



Holley J L CJASN 2012;7:1033-1038

CJASN

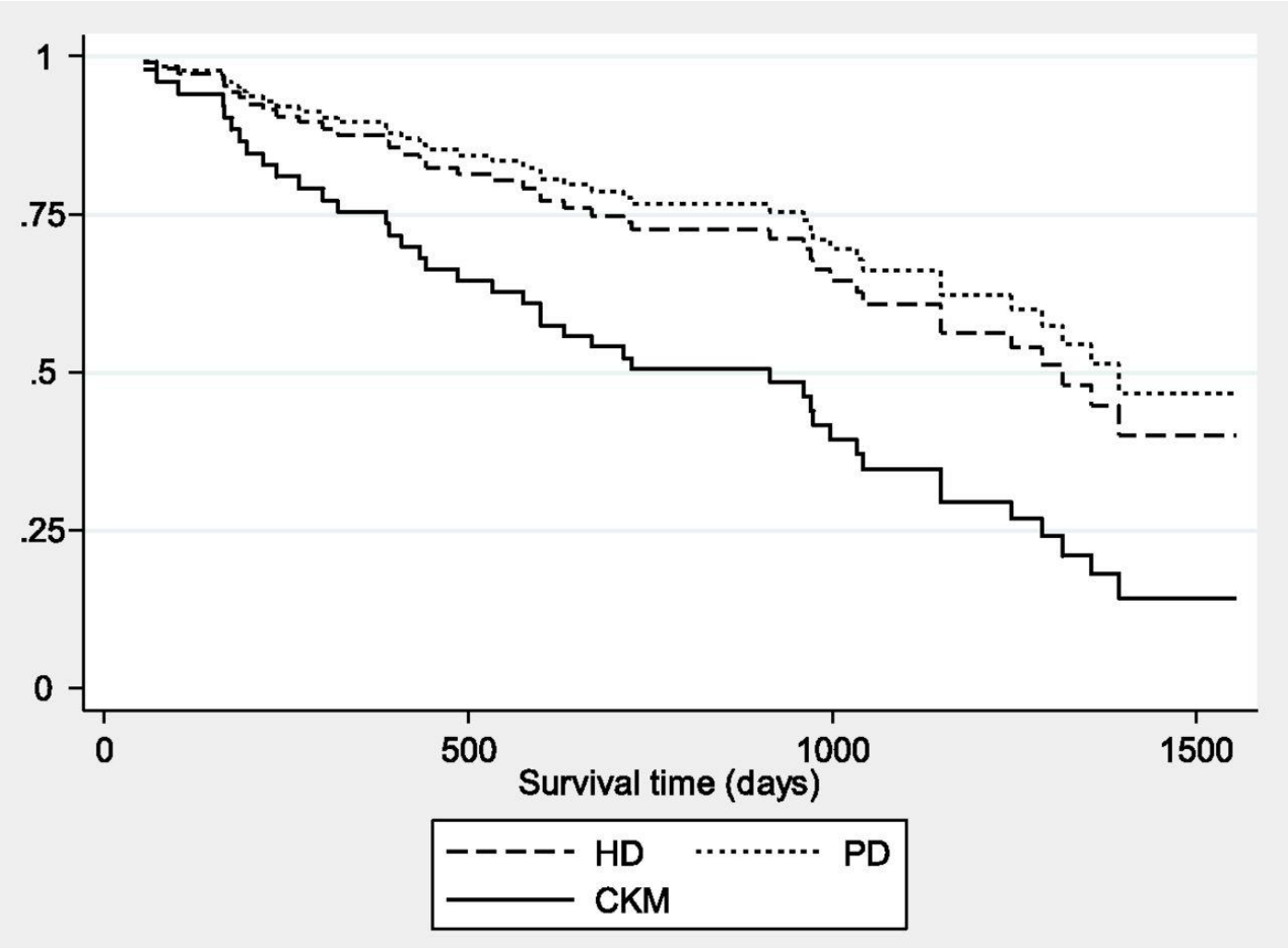
Survival with CM

- Challenging to study
- RCT not practical
  - Patients choose RRT vs CM
  - When to enroll/when does clock start
  - New causal inference methodologies?

Survival with CM

- Da Silva-Gane CJASN 2012
  - “Low clearance clinic” – in practice meant eGFR was <15 ml/min/1.73m^2
  - Patients choose modality or CKM, reassessed/recommit at regular intervals
  - Propensity score to control for selection bias in analyses
- Shorter survival than with dialysis?
  - Median survival 30 months vs 43 months (difference of 404 days)
  - BUT, those choosing dialysis were dialyzed a median of 326 days of those 43 months
    - i.e. on average 80% of the survival benefit days “spent” undergoing dialysis (does not include hospitalizations, procedures etc.)

Adjusted Cox survival functions for patients receiving hemodialysis (HD), peritoneal dialysis (PD), and conservative kidney management (CKM).



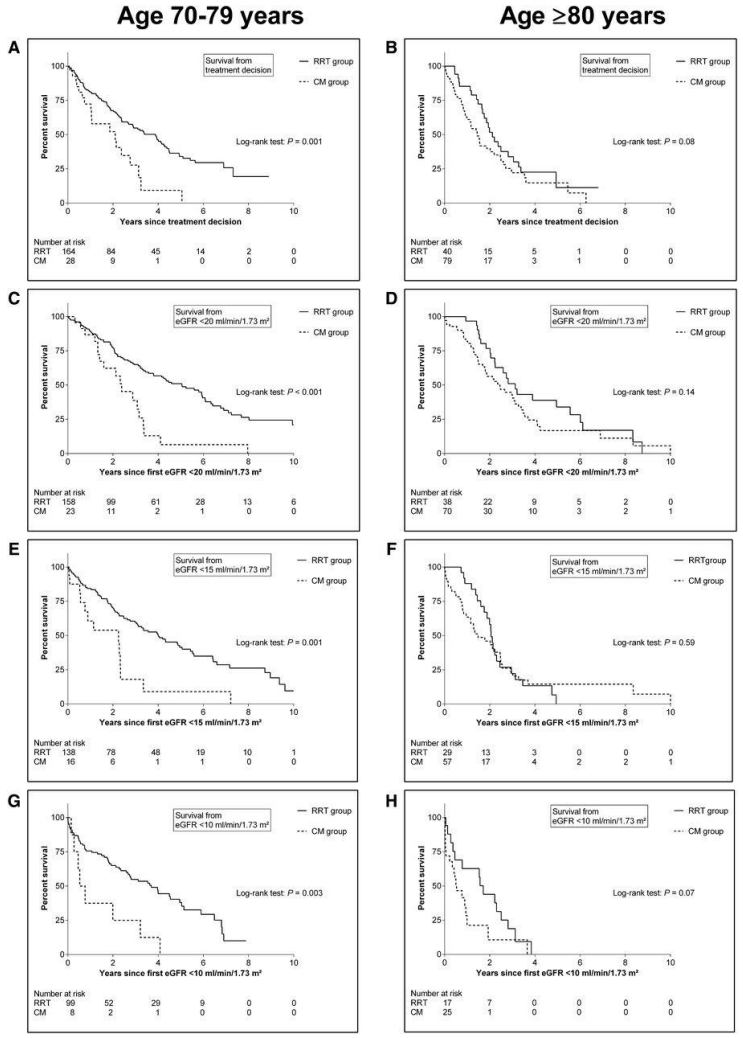
Da Silva-Gane M et al. CJASN 2012;7:2002-2009

CJASN

Survival with CM

- Verberne CJASN 2016
  - Retrospective, single center
  - Choose at enrollment – eGFR somewhat variable but generally <20ml/min/1.73m^2
- Overall, survival from time of decision for age >70 was 3.1 years for RRT vs 1.5 years for CM
- Intention to treat (ITT)?
  - Many in both groups died before reached eGFR <10ml/min/1.73m^2 or never reached – power?
  - studying theoretical decision more than the actual modality/outcome
  - perhaps studying conservative management vs “usual” CKD Stage 5 care?
- For those 80 years of age and older, survival may be the same with dialysis or CM

Kaplan–Meier survival curves comparing both treatment groups with stratification of age using different starting points in survival calculation.



Wouter R. Verberne et al. CJASN
doi:10.2215/CJN.07510715

CJASN

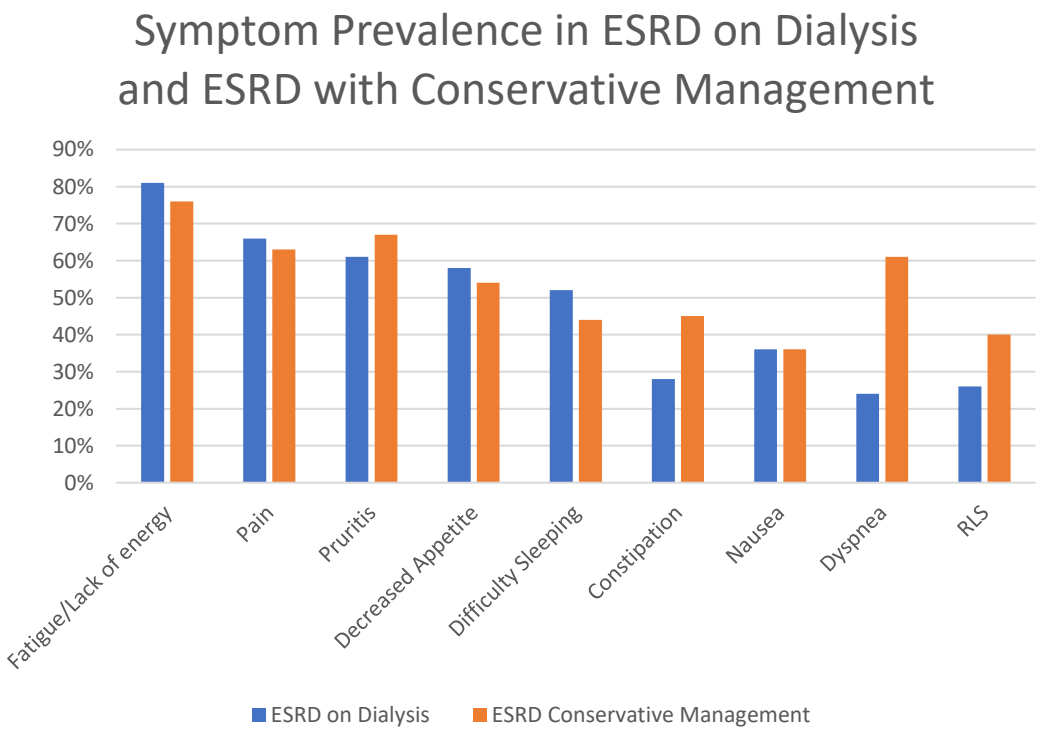
Survival with CM

- Monez-Rath Annals of IM 2024
  - “Targeted Trial” – like a simulated RCT using observational data
  - Starting dialysis within 30 days of eGFR <12ml/min/1.73m^2 vs “medical management”
  - ITT and Per protocol analysis
- No difference in survival for ITT
  - Nearly half of medical management crossed over to dialysis
  - Studying whether dialysis initiated at first eGFR<12 vs any actual decision
- Per Protocol analysis longer survival and less time at home with dialysis
- For those 80 years of age and older, survival longer and time at home shorter with dialysis in both analyses

Quality of Life with CM

- Initiation of dialysis associated with decline in functional status and QoL
  - Functional decline in institutionalized patients (Kurella-Tamura NEJM 2009)
  - May also extend to community dwelling elders (reported >30% increase in dependence after initiating HD) (Jassal NEJM 2009)
- With conservative therapy, possibly preserved QOL compared to dialysis
  - Da Silva-Gane: preserved Satisfaction with Life Score with CM
- Symptoms?

Symptoms



Based on Almutary J Renal Care 2013

Table 2. Prevalence of symptoms[a]

Symptom	ESRD (n = 90)	CKD (n = 87)	P value[b]
Feeling tired or lack of energy	71 (79)	68 (78)	1.0
Worrying	42 (47)	52 (59)	0.1
Dry skin	42 (47)	46 (53)	0.5
Itching	46 (51)	38 (44)	0.4
Trouble staying asleep	50 (56)	38 (44)	0.1
Trouble falling asleep	54 (60)	38 (44)	0.04
Feeling sad	30 (33)	37 (43)	0.2
Feeling irritable	33 (37)	37 (43)	0.5
Difficulty becoming sexually aroused	42 (47)	35 (40)	0.5
Bone or joint pain	30 (33)	34 (39)	0.4
Muscle cramps	45 (50)	33 (38)	0.1
Feeling anxious	28 (31)	33 (38)	0.3
Decreased interest in sex	39 (43)	31 (36)	0.4
Dry mouth	45 (50)	30 (34)	0.05
Constipation	23 (26)	30 (33)	0.3
Swelling in legs	22 (24)	28 (32)	0.3
Restless legs	35 (39)	28 (32)	0.4
Feeling nervous	26 (29)	27 (31)	0.9
Headache	23 (26)	26 (30)	0.6
Diarrhea	25 (28)	22 (25)	0.7
Decreased appetite	29 (32)	22 (25)	0.3
Cough	28 (31)	21 (24)	0.3
Muscle soreness	30 (33)	21 (24)	0.2
Nausea	24 (27)	21 (24)	0.7
Lightheadedness or dizziness	35 (39)	20 (23)	0.02
Shortness of breath	21 (23)	19 (22)	0.9
Difficulty concentrating	25 (28)	19 (22)	0.4
Numbness or tingling in feet	27 (30)	18 (21)	0.2
Vomiting	12 (13)	10 (11)	0.8
Chest pain	7 (8)	7 (8)	1.0

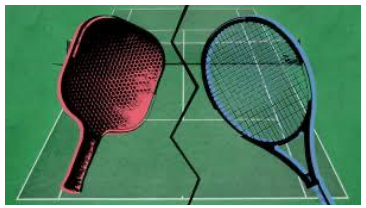
[a]Data reported as n (%).
[b]All P values are pre-Bonferroni correction.

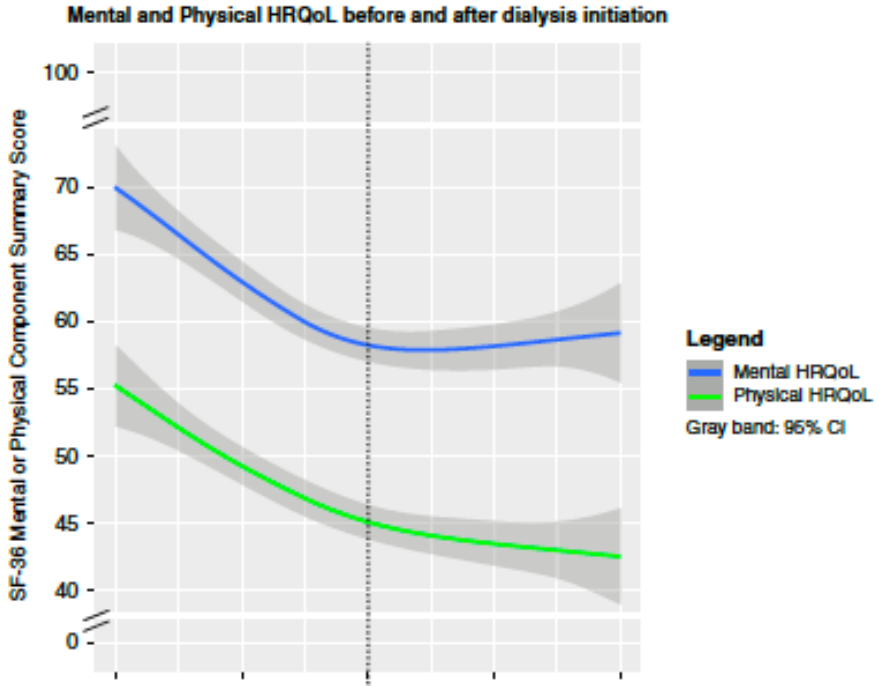
Abdel-Kader CJASN 2009

Symptom assessment at any moment – possibly relieved by dialysis?

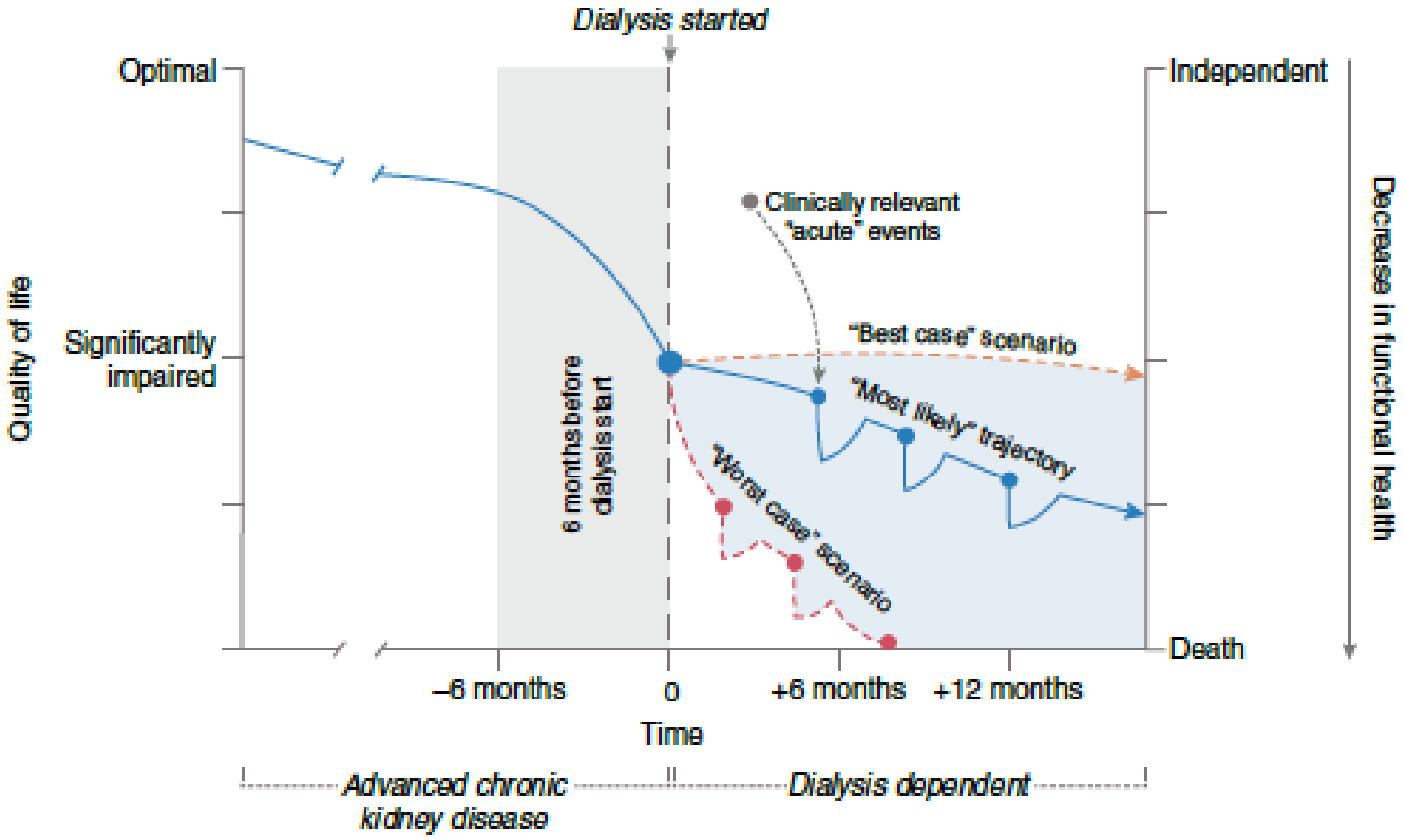
QoL with dialysis initiation

- De Rooij CJASN 2022
  - SF36 to assess QoL 1 year before and 6 months after initiation of dialysis, various sensitivity analyses
- QoL preserved with initiation – a matter of perspective?
- Limitations
  - Missing data – systematically biased?
  - Changing QoL perception
    - Response Shift Theory
      - Recalibration and Reprioritization





Revised construct



Fonseca-Correa and Jassal, CJASN 2022

Question

- Which one of the following statements about conservative management (CM) is correct?
- A. quality of life with CM and dialysis are equivalent
- B. survival with CM is equivalent to dialysis for patients under 65
- C. survival with CM may be similar to dialysis for some patients
- D. survival with dialysis is higher than with CM for all patients

Answer

C: Survival may be similar

- A. DaSilva-Gane demonstrated less decline in one QoL measure with CKM
- B. Survival on dialysis better for age <65 (and possibly age <80)
- C. **Over 80 (Verberne), co-morbidities (various)**
- D. May not be

Question

- Which of the following is true with respect to outcomes after dialysis initiation for this patient?
- A. His quality of life will improve
- B. He will need to be in a nursing home
- C. He will require fewer hospitalizations
- D. He may become more functionally dependent

Answer

D: May become more functionally dependent

- A. Quality of life is reported to decline after initiation of dialysis
- B. Need for institutionalization is very individualized
- C. Hospitalizations and readmissions are a common experience for dialysis patients
- **D. In patients over age 80, functional dependence has been reported to develop in the 6 months after dialysis initiation** **(Jassal NEJM 2012)**

Conservative Management Summary

- More than just no dialysis?
- Survival – equipoise?
- Quality of Life – maybe preserved?
- Symptom Control?
- Future Directions:
  - Conservative Management – define care pathway?

Summary

- Geriatric Nephrology – an approach, not just old kidneys
- CKD care individualized
- Access considerations – fistula first?
- Conservative Management – enough for equipoise?

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