

Rehabilitation of the patients with end-stage renal failure

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Rehabilitation of the patients with end-stage renal failure

Objectives:

- Understanding common issues in end stage renal failure patients
- How do we rehabilitate ESRF patients ?
- What are the benefits of exercises?
- What are the challenges?

- The number of patients with ESRF is increasing in world wide

Singapore Data:

- Increasing trend of CKD5 patients (from 1999 to 2011)
- 1443 new CKD5 patients (2010) → 1544 new CKD5 patients in 2011
- Mean and median age: 64.2 yrs (2010), 65.4 yrs (median 65.9 years) in 2011

Figure 6.1: NEW DIALYSIS PATIENTS, 1999 – 2011

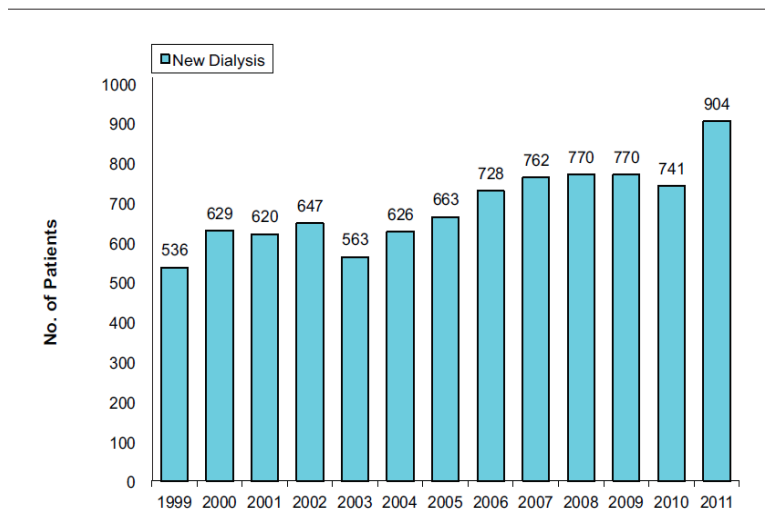
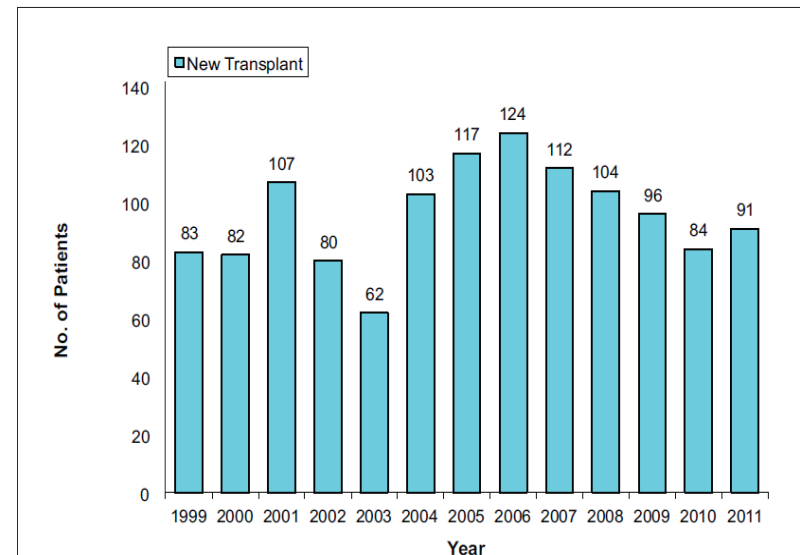


Figure 6.2: NEW TRANSPLANTS, 1999 – 2011



- Development of dialysis and the increasing availability of RRT is the reason elderly patients have become a growing population in dialysis centers
- Average age of hemodialyzed patients in many countries exceeds 60 years
- Need to understand common issues in ESRF patient
- Plan to provide coordinated and meaningful renal rehabilitation program

Case

Mr. PKH, 66 years old, a Chinese gentleman,

- Stays with wife and daughter
- Pre-morbid ADLs and ambulation: Independent, able to go to dialysis center independently without walking aid

- Back ground medical h/o:

Hyperlipidemia, HPT, Gout, H/O of depression, pAF, ESRF on HD since early 2011

- Admitted for recurrent line sepsis with MSSA bacteraemia (3rd time line sepsis in past 4 months)
- After he was treated with antibiotics at renal HD unit for about 2 weeks → he was stabilized
- Then he was referred to us for de-conditioning as he was not able to tolerate a lot of activities (mod assist in ADLs and only able to walk < 5M)

Urea, serum		* ↑ 23.8			
Sodium, serum		* 137			
Potassium, serum		* 4.5			
Chloride, serum		* 102			
Bicarbonate, serum		* 19.2			
Glucose, serum		* 10.0			
Creatinine, serum		* ↑ 715			
Endocrine					
PTH (Intact), serum					* ↑ 7.1
Procalcitonin				* ↑ 1.4	
Liver Function Test					
Protein Total, serum		* ↓ 60	* ↓ 60		
Albumin, serum		* ↓ 26	* ↓ 25		* ↓ 25
Bilirubin Total, serum		* 9	* 10		
Alkaline Phosphatase, serum		* ↑ 159	* ↑ 124		
Alanine Transaminase, serum		* ↑ 71	* ↑ 48		
Aspartate Transaminase, serum		* ↑ 71	* 30		
Renal Function					
Calcium Total, serum					* ↓ 2.05
Phosphate Inorganic, serum					* ↑ 2.08
Gamma-Glutamyl Transferase, serum		* ↑ 266	* ↑ 210		
Liver Panel (TP/ALB/TBIL/ALP/ALT/AST), seru...		* *****	* *****		
Special					
C-Reactive Protein, serum					* ↑ 33.0

Haemoglobin		* ↓ 7.8	* ↓ 9.0		* ↓ 8.6	* ↓ 8.1	* ↓ 8.0	* ↓ 7.2
WBC Count		* ↑ 17.39	* ↑ 15.84		* ↑ 14.70	* ↑ 14.53	* ↑ 15.17	* ↑ 16.47
Platelet Count		* 433	* 353		* 279	* 230	* 200	* 174
RBC Count		* ↓ 2.64	* ↓ 3.07		* ↓ 2.94	* ↓ 2.77	* ↓ 2.74	* ↓ 2.46
MCV		* 88.6	* 87.6		* 87.1	* 88.1	* 89.1	* 90.2
MCH		* 29.5	* 29.3		* 29.3	* 29.2	* 29.2	* 29.3
MCHC		* 33.3	* 33.5		* 33.6	* 33.2	* 32.8	* 32.4
RBC Distribution Width		* ↑ 18.2	* ↑ 17.6		* ↑ 17.7	* ↑ 17.9	* ↑ 18.1	* ↑ 18.4
Mean Platelet Volume		* 11.0	* 10.8		* 10.5	* 10.4	* 10.5	* 10.8
Reticulocyte Count								
ESR								
Neutrophil		* 68.0	* 71.0		* 69.1	* 73.3	* 70.0	* 64.0
Lymphocyte		* ↓ 9.0	* ↓ 10.0		* ↓ 11.2	* ↓ 9.0	* ↓ 8.0	* ↓ 11.0
Monocyte		* 4.0	* ↑ 11.0		* ↑ 10.7	* 7.1	* 8.0	* 9.0
Eosinophil		* 4.0	* 5.0		* ↑ 7.2	* ↑ 9.2	* ↑ 12.0	* ↑ 14.0
Basophil			* ↑ 3.0		* ↑ 1.8	* ↑ 1.4		
Large Unstained Cell								
Atypical Mononuclear Cell								
N. Myelocyte		* ↑ 15.0					* ↑ 2.0	* ↑ 2.0
WBC Comment								
Platelet Comment								
RBC Comment								
Ovalocytes								
Haematocrit		* ↓ 23.4	* ↓ 26.9		* ↓ 25.6	* ↓ 24.4	* ↓ 24.4	* ↓ 22.2

Common Issues in ESRF rehabilitation

I. **Age** _ 60-69 yrs

II. **Co-morbidities** _ (High incidence of medical co-morbidities/illnesses (cardiac, stroke, PVD, Poly-neuropathy, DM, anemia)

III. **Symptoms** _like fatigue, muscle cramp and weakness:

Fatigue: Prevalence: 60%-97%

- A subjective, unpleasant symptom which incorporates total body feelings ranging from tiredness to exhaustion creating an unrelenting overall condition which interferes with individuals' ability to function to their normal capacity

Weakness:

- Muscle biopsies: myopathy and denervation atrophy & myopathy persists even with adequate HD
- Level of function & aerobic capacity tends to be only ½ of normal

Common Issues in ESRF rehabilitation

IV. Physiologic etiologies:

- Anemia:
 - Deterioration in cardiac function, reduce exercise tolerance & aerobic capacity
 - Decreased cognition and mental acuity, fatigue, weakness
- Metabolic acidosis, uremia, dialysis inadequacy
- Hyperparathyroidism, vit D deficiency, insulin resistance
- Side effects of medications
- Dietary and fluid restriction (malnutrition)
- Inflammatory cytokines:
 - Significantly higher levels of resting energy expenditure & associated with higher mortality

V. Medical complications:

- Sepsis, anemia, muscle atrophy, cognitive impairments, frailty, musculoskeletal complication such as amputation and metabolic bone & joint diseases

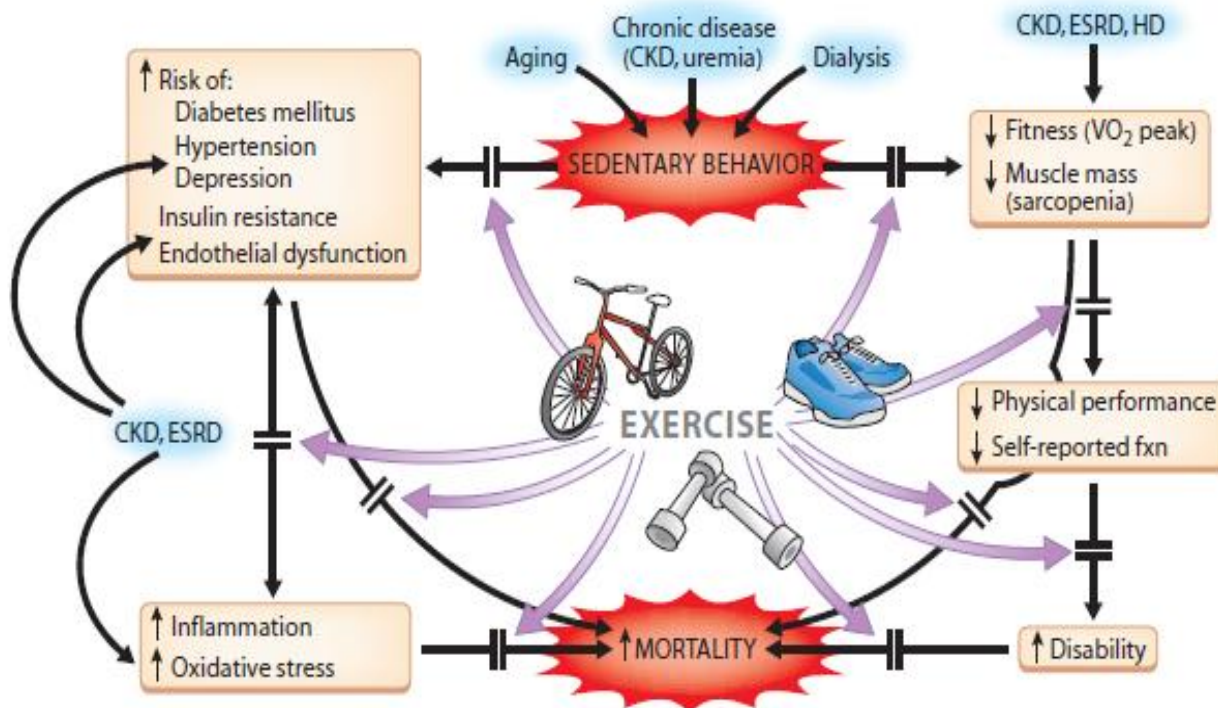
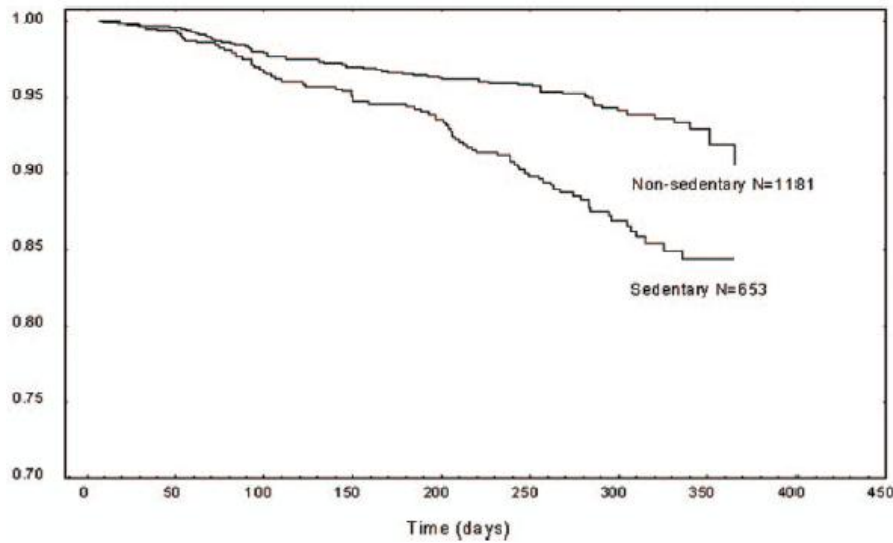
Common Issues in ESRF rehabilitation

VII. Psychosocial _ Depression, Sleep disorders, Pain:

- Common (15 to 40%)- both dialysis patients and those undergoing rehabilitation
- Depression- correlated to worse outcomes (mortality, morbidity, functional outcomes)

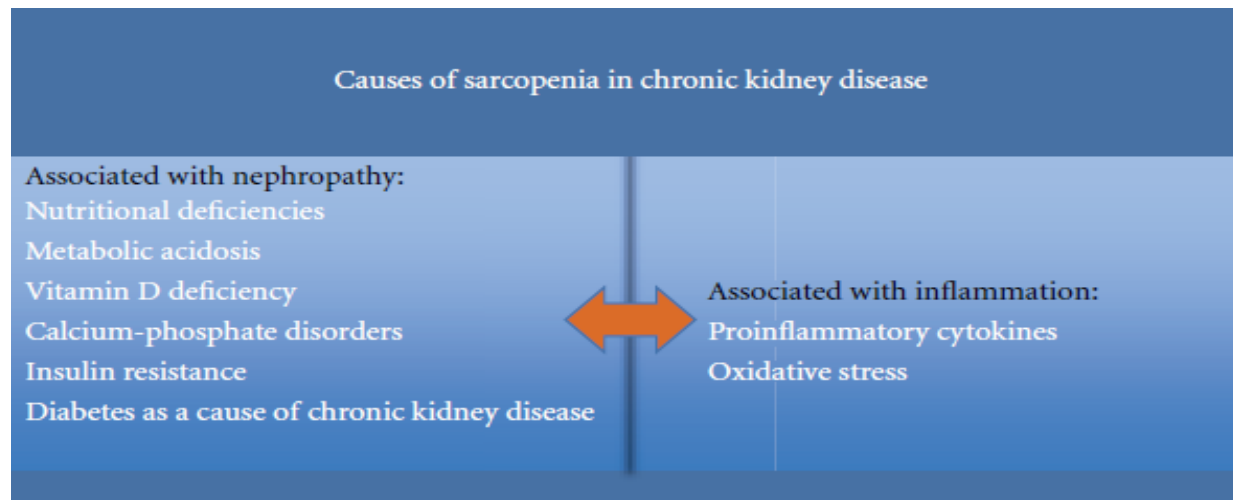
VIII. Behavioral etiologies:

- Physical inactivity (**Major Issue**)
- Lack of motivation



Sarcopenia

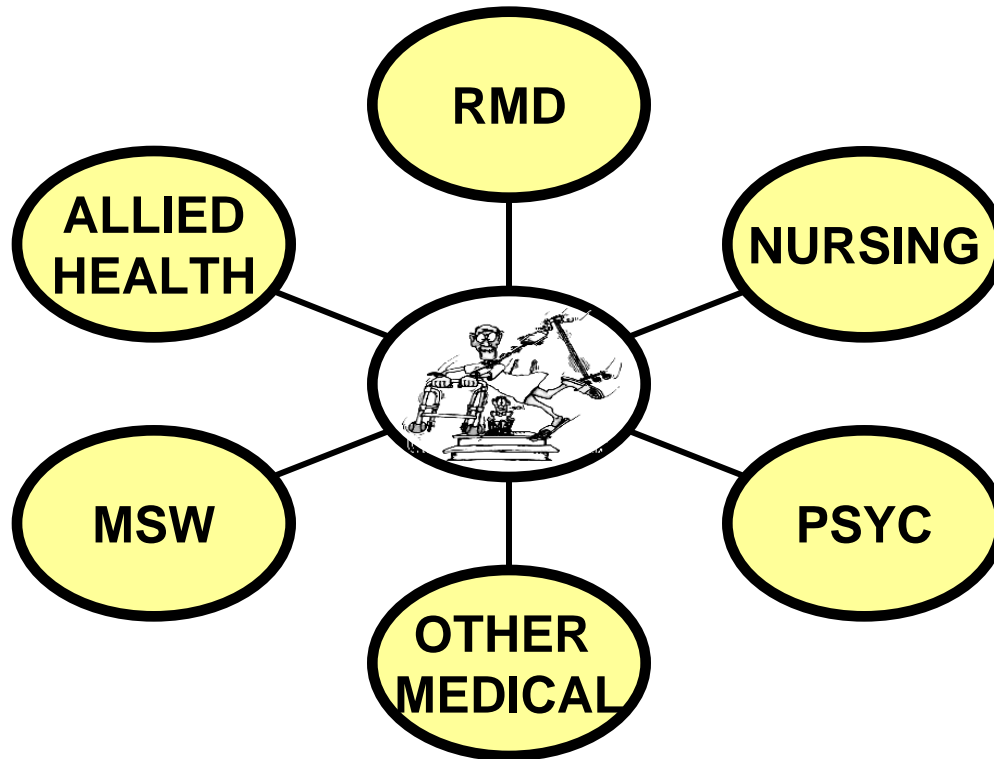
- A condition arising in many elderly people mainly as a result of reduced physical activity & a multifaceted etiology of the phenomenon
- Rate of muscle loss with age: ~1%–2% per year past the age of 50 years
- Immobility decreases strength by 1-1.5% per day
- In CKD patients, loss of muscle mass is much more intensive & younger than expected



What is rehabilitation

- **Rehabilitation:** A process by which form and function is restored after injury or illness, such that life can be lived to the fullest capacity compatible with the degree of abilities and disabilities
- **As modern medicine adds years to life, rehabilitation becomes increasingly necessary to add life to these years (Frederic J. Kottke)**
- RR is coordinated, multifaceted interventions designed to optimize a renal patient's physical, psychological, and social functioning
- Impact of lower functional status & mortality can be reduced by offering rehabilitation to dialysis patients
- Modulates the risk of cardiovascular disease

How do we rehabilitate ESRF patients



How do we rehabilitate ESRF patients

- Designed to enhance physical fitness & promote health

Optimal exercise prescription is determined by:

- Understanding personal goals, setting realistic goals & exercise regimes/preferences
 - **Co-ordinate rehab activities with patient's schedules**
 - **Discussion options with families/patients**
- Careful attention to co-morbidities (risk factor profile), medications and complications
 - **How much BP and HR variation can be allowed from baseline**

Components of Exercise prescription: FITTP

Mode (Type): Particular form/type of exercise

- Desired outcomes (Aerobic training/ Strength training/ Flexibility)
- Aerobic training: Jogging, cycling, walking, swimming, stair climbing
- Strength training: minimum of 8-10 exercises that train major m/s groups
- Combined aerobic and resistance exercise
 - Grip strength → below the 50th percentile in 70% of ESRF patients
 - Quadriceps weakness → progress to the point of dependency in getting in and out of a bed (solely from progressive deconditioning, not related to intrinsic aging or new onset of disease)
 - Abnormal forces to act on bone, joints, ligaments and tendons → Increased falls risk and pain syndromes
- Should not impose significant orthopedic stress

Components of Exercise prescription: FITTP

Intensity:

1) Max HR Methods:

➤ HR max= 220-age

70% to 85% of HR max approximates 55% to 75 %
of VO2 max



2) Heart Rate Reserve Method:

➤ Lowest target HR= [(HR max-HR rest)x0.5]+HR rest

➤ High target HR= [(HR max-HR rest)x0.85]+HR rest

40% to 85% of maximal reserve

3) Rating of Perceived Exertion: **Borg Scale**

Borg Scale: 15-Grade Rating of Perceived Exertion

- 6 No exertion at all
- 7
- 8
- 9 Very light
- 10
- 11 Light
- 12
- 13 Somewhat hard
- 14
- 15 Hard (heavy)
- 16
- 17 Very hard
- 18
- 19 Extremely hard
- 20 Maximal exertion

Components of Exercise prescription: FITTP

Duration (Time):

- 150 min/wk or 30 min per day (ACSM recommendation)
- In elderly ESRF patients → difficulty sustaining exercises for 20 min
- Modification: Option should be several 10 min bouts throughout the day
- 10 min warm up and 10 min cool down

Frequency: 3 to 5 days a week

Progress:

- Depends on several factors, including the individual's current activity levels, physiologic limitations, health, age, and exercise goals

How do we rehabilitate ESRF patients

- Systematic assessment of progress
 - outcomes measures: FIM, 6 min walk test, Gait speed, Grip Strength
- Attention to psychosocial issues
- Early comprehensive discharge planning
 - Equipments prescription
 - Home modification
 - Outpatient therapy
- Continuity of care & Education
- Vocational programs
 - To reduce the caregiver and societal burden in the long run
 - Improve the eventual re-employment rate



Benefits ?

- Improved quality of life, sleep quality scores, & reduce anxiety
- Reduce the risk of sarcopenia
- Less bothered by bodily pain or lack of appetite
- More positive patient affect and fewer depressive symptoms
- Lower mortality risk among regular exercisers
- Increase muscle mass/strength and VO2 max
- Increase LV function & renal function

Renal Rehabilitation: Present and Future Perspectives Masahiro Kohzuki

Exercise in the End-Stage Renal Disease Population

Kirsten L. Johansen

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Benefits ?

- Fewer limitations in physical activities & improve physical functioning
 - Gait speed
 - 6-min walk distance
 - Ability to stand from a chair
 - Self-reported physical functioning using the SF-36
 - Less fatigue
- Reduced Sub-maximal HR & improved BP
- Reduced CRP and increased Albumin

EXERCISE TRAINING IN PATIENTS WITH END-STAGE RENAL DISEASE ON HEMODIALYSIS: COMPARISON OF THREE REHABILITATION PROGRAMS

Erasmia Konstantinidou,¹ Georgia Koukouvou,¹ Evangelia Kouidi,¹ Asterios Deligiannis¹ and Achilles Tourkantonis²

Physical exercise among participants in the Dialysis Outcomes and Practice Patterns Study (DOPPS): correlates and associated outcomes

Francesca Tentori¹, Stacey J. Elder¹, Jyothi Thumma¹, Ronald L. Pisoni¹, Juergen Bommer², Rachel B. Fissell^{3,4}, Shunichi Fukuhara⁵, Michel Jadoul⁶, Marcia L. Keen⁷, Rajiv Saran⁸, Sylvia P. B. Ramirez¹ and Bruce M. Robinson^{1,8}

When should start Rehabilitation?

- Ideally, should start since pre-dialysis
- Physical activity and functioning for ESRD patients should be assessed for **ALL patients at dialysis units**
- K/DOQI guidelines on management of CVS disease “all dialysis patients should be counselled and regularly encouraged by nephrology and dialysis staff to increase their level of physical activity”

Challenges ?



- Availability of active rehab program

- Located within or close proximity to acute hospitals and outpatient rehab centres
- Manpower of staffs
- Financial support
- Rehabilitation facility (not available at BVH campus)

- Local centers, including acute hospitals, community hospitals, outpatient centers & NHs offer variable degrees of rehabilitation intensity and no consistent functional outcome measures

- Compliance

- Once discharge from acute hospital, tend to default to continue outpatient rehab program

Challenges ?

- Guidelines
(example: guidelines for anemia → ? when to transfuse)
- Standard assessment tools & outcome measures:
 - Fatigue scale
 - 6 min walk test
 - 30 Second sit to stand test
 - Berg balance scale & Grip strength
 - Depression scale
 - Self-report instruments to assess functional status and HRQOL
- Database
- Care givers: domestic helpers are available and thus more rely on them
- Aging population with less physically active patients
- Awareness issue (both patient & health care personnel)

MR PKH Progress:

1st week:

- Needs a lot of coaxing to participate therapy
- Tachycardic at base line and during therapy
- Improved to moderate assistance level (ADLs, able to ambulate with WF about 10 M)
- Exercise tolerance is poor and thus need to break down exercise sessions
- Reviewed by Psy: depression- stable

End of 2nd week:

- Looks more participation and he was looking forward therapies sessions
- Improved to min assist level in ADLs and walking distance is about 20 M

End of 3rd week:

- Able to do seated ADLs: modified independent
- Standing ADLs: Supervision
- Able to walk 20 M with BBQS, supervision level
- Went home with day rehabilitation referral upon d/c

Summary

- ESRF rehabilitation is a challenging field of increasing public health importance
- Rehabilitation can potentially modify adverse functional outcomes in ESRF pts
- Complexity of medical issues, pressing need for rehab services and manpower will not be lesser in future
- Addressing patient's symptoms are critical
- Identify common issues and barriers & try to fix them early
- Early goal directed treatment & matching the appropriate exercise regimes for the patients
- Exercise and physical activity is equally as important as medication & dialysis treatment itself

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Thank You

