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Проблемы физической активности

в нефрологической помощи

Mai Rosenberg MD ScDr (med)

XIV Общероссийская научно-практическая конференция РДО

UNIVERSITY OF TARTU
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Barriers of Physical Activity within Nephrological Care

Mai Rosenberg MD ScDr (med)

November 22, 2019 Moscow

Overview of talk

- **Introduction / Background**
- **Our studies:**

  - Regular aquatic exercise for chronic kidney disease patients and a ten-year follow-up study (*Pechter et al. Nephrol Dial Transplant, 2003; Int J Rehabil Res, 2003, Int J Rehabil Res, 2014)*

  - Impact of walking on health-related quality of life scores in patients with chronic kidney disease: A cross-sectional study in Estonia (*Pechter Ü, et al. Baltic Nepheology Conference 2016, IJKD 2019, Submitted)*

  – Physical activity among nephrologists, residents and nurses - observational cross-sectional survey (*Posterpresentation, ERA-EDTA 54. congress 2017*)

- **Barriers to utilization of physical activity and renal rehabilitation**

- **Future directions**

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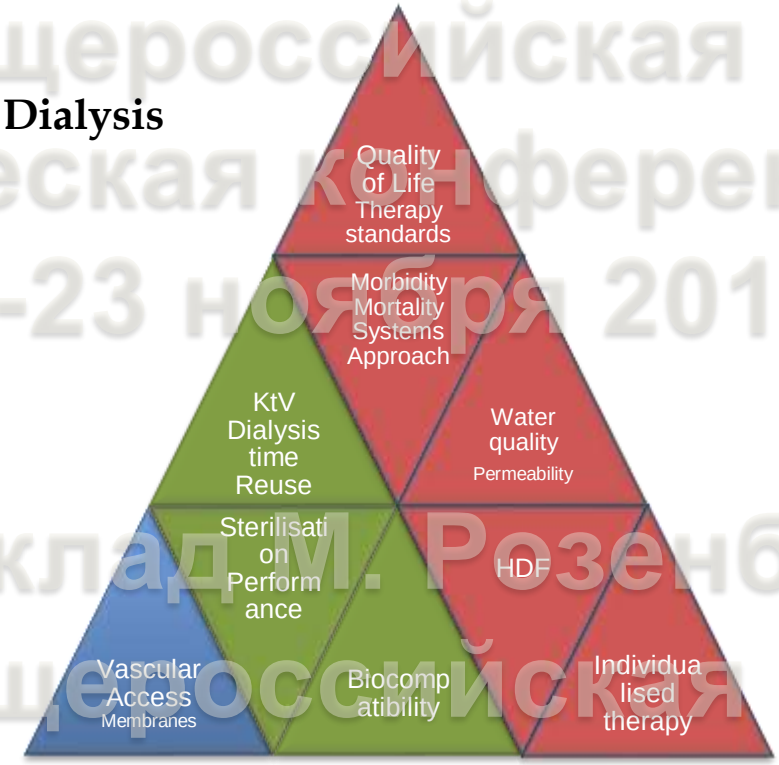
- **Future directions**

Introduction

Changing Topics in Dialysis



Data source: *Modified figure from N. Levin talk "Strategies to reduce mortality in ESRD population on dialysis" (2015, ISN website)*

Introduction

Chronic kidney disease (CKD) patients are getting older, are almost invariably hypertensive, have decreased physical activity (PA) and increased psychosocial problems.

Patients with CKD have elevated cardiovascular disease (CVD) risk.

Physical activity (PA) is known as an independent CVD risk factor

Despite the fact that current clinical practice guidelines recommend PA for CKD patients, PA is obviously rarely addressed by renal care teams.

Frequency of participation in leisure time physical activity in CKD patients

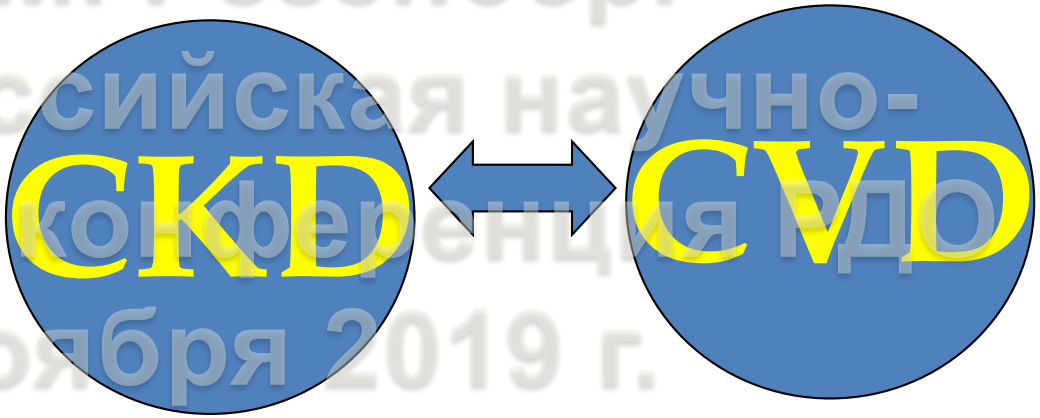
Response	DMMS Wave 2 (% responding) ($n = 2264$)	DOPPS (% responding) ($n = 20\,920$)
Never or almost never	35.1	42.9
<1 once a week	10.0	8.5
2–3 times per week	18.4	17.0
4–5 times per week	5.5	5.7
Daily or almost daily	19.8	14.1

DMMS, United States Renal Data System Dialysis Morbidity and Mortality Study; DOPPS, Dialysis Outcomes and Practice Patterns Study.

Data source: *Painter P, Roshanravan B. Curr Opin Nephrol Hypertens 2013; 22:615-23*

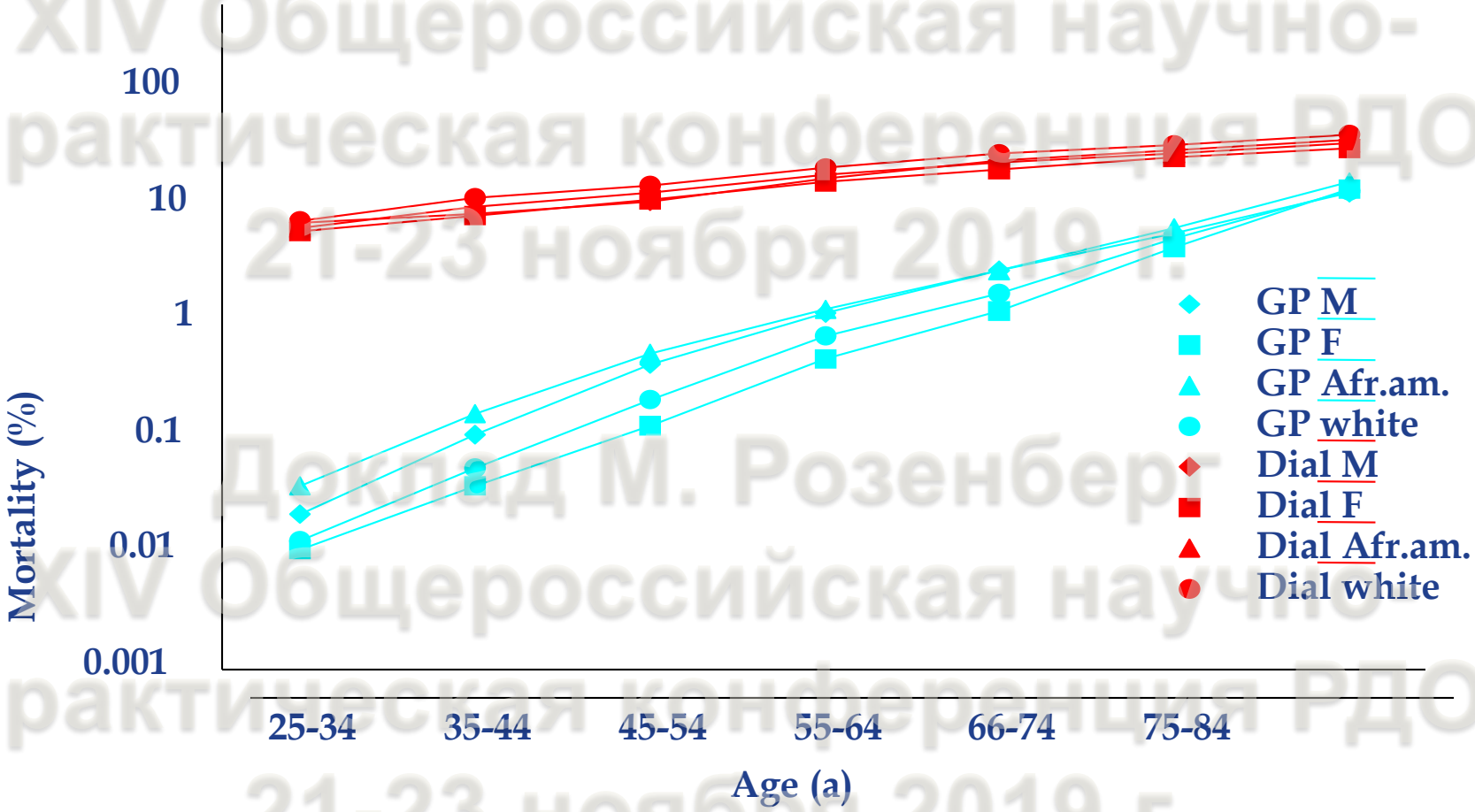
CKD patients have increased risk of death

- **CKD patients belong in the highest risk group for subsequent atherosclerotic complications.**
- **Main cause of death in patients with CKD is cardiovascular disease.**
- **The risk of death in CKD stage 4–5 patients are 10–20-fold that of the general population**



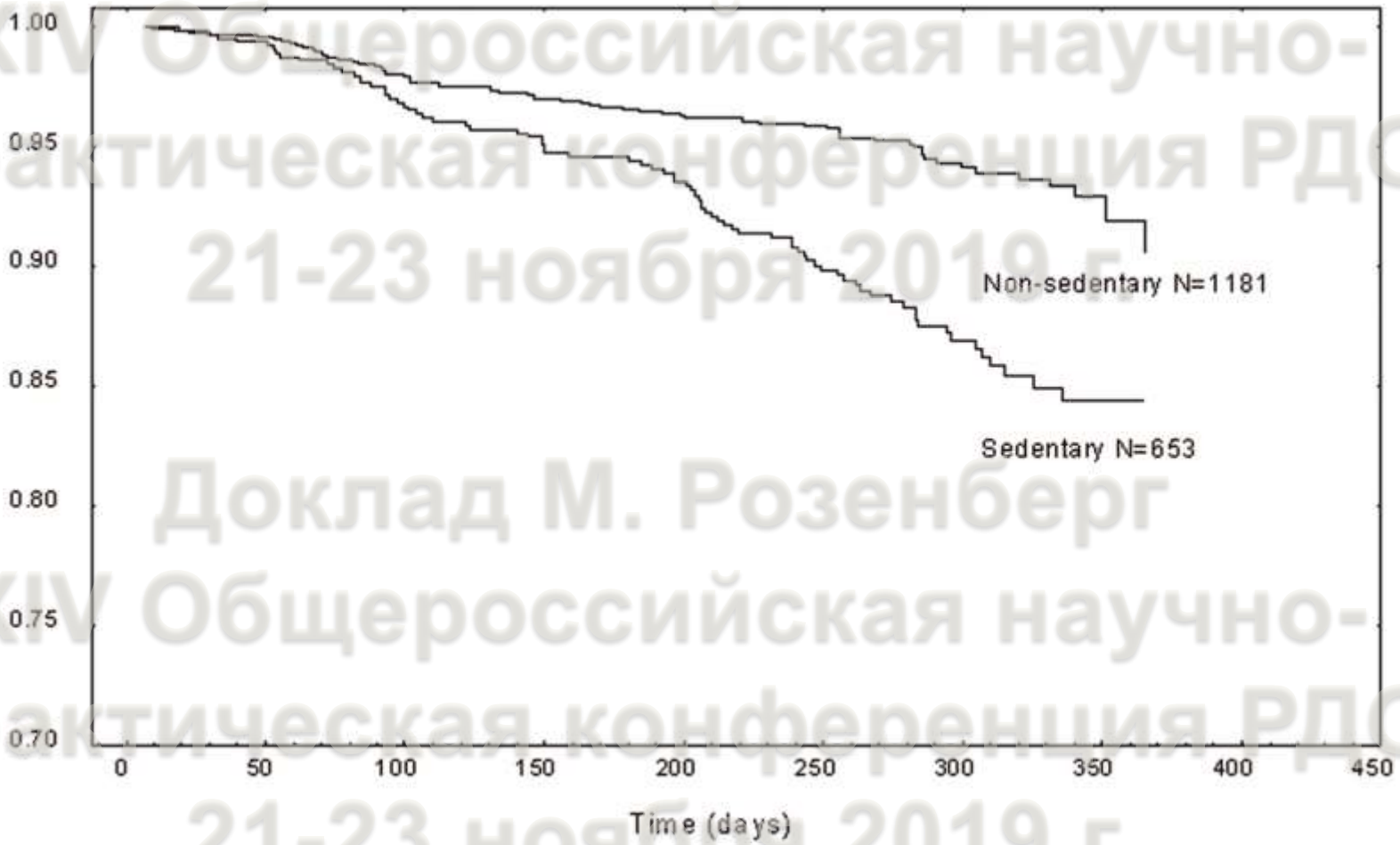
Data source: Meyer KB and L. AS., *Controlling the epidemic of CVD in chronic renal disease: report from the National Kidney Foundation Task Force on cardiovascular disease.* JASN, 1998. 912(12)

Mortality of RRT patients in comparison with general population



Data source: Foley RN, et al. Am J Kidney Dis. 1998;32(suppl 3):S112-S119.

Survival among sedentary and non-sedentary incident dialysis patients.



Data source: Kirsten L. Johansen JASN 2007;18:1845-1854

Low level of PA in CKD

- Low levels of PA and poor physical functioning in patients with CKD are strongly associated with poor clinical outcomes, regardless of treatment modality (*Painter & Roshanravan, 2013*).

- Low levels of PA may lead to a higher risk of dialysis and death (*Walker et al, 2013*).

Data source: *Painter P, Roshanravan B. Curr Opin Nephrol Hypertens 2013; 22:615-23*

Data source: Sandesara et al. REVIEW TOPIC OF THE WEEK. Cardiac Rehabilitation and Risk Reduction. Time to “Rebrand and Reinvigorate” J Am Coll Cardiol 2015

Guidelines

- KDIGO recommendations stress the importance of preventive measures for renal patients, as early as possible in the course of kidney failure

- Then these can be most effective, cost efficient, and of greatest benefit to patients and to society

Доклад М. Розенберг
XIV Общероссийская научно-практическая конференция РДО
21-23 ноября 2019 г.

Recommendations for patients with CKD

Lifestyle

3.1.21: We recommend that people with CKD be encouraged to undertake physical activity compatible with cardiovascular health and tolerance (aiming for at least 30 minutes 5 times per week), achieve a healthy weight (BMI 20 to 25, according to country specific demographics), and stop smoking. (1D)

Additional dietary advice

3.1.22: We recommend that individuals with CKD receive expert dietary advice and information in the context of an education program, tailored to severity of CKD.

Data source: *http://www.kdigo.org/*

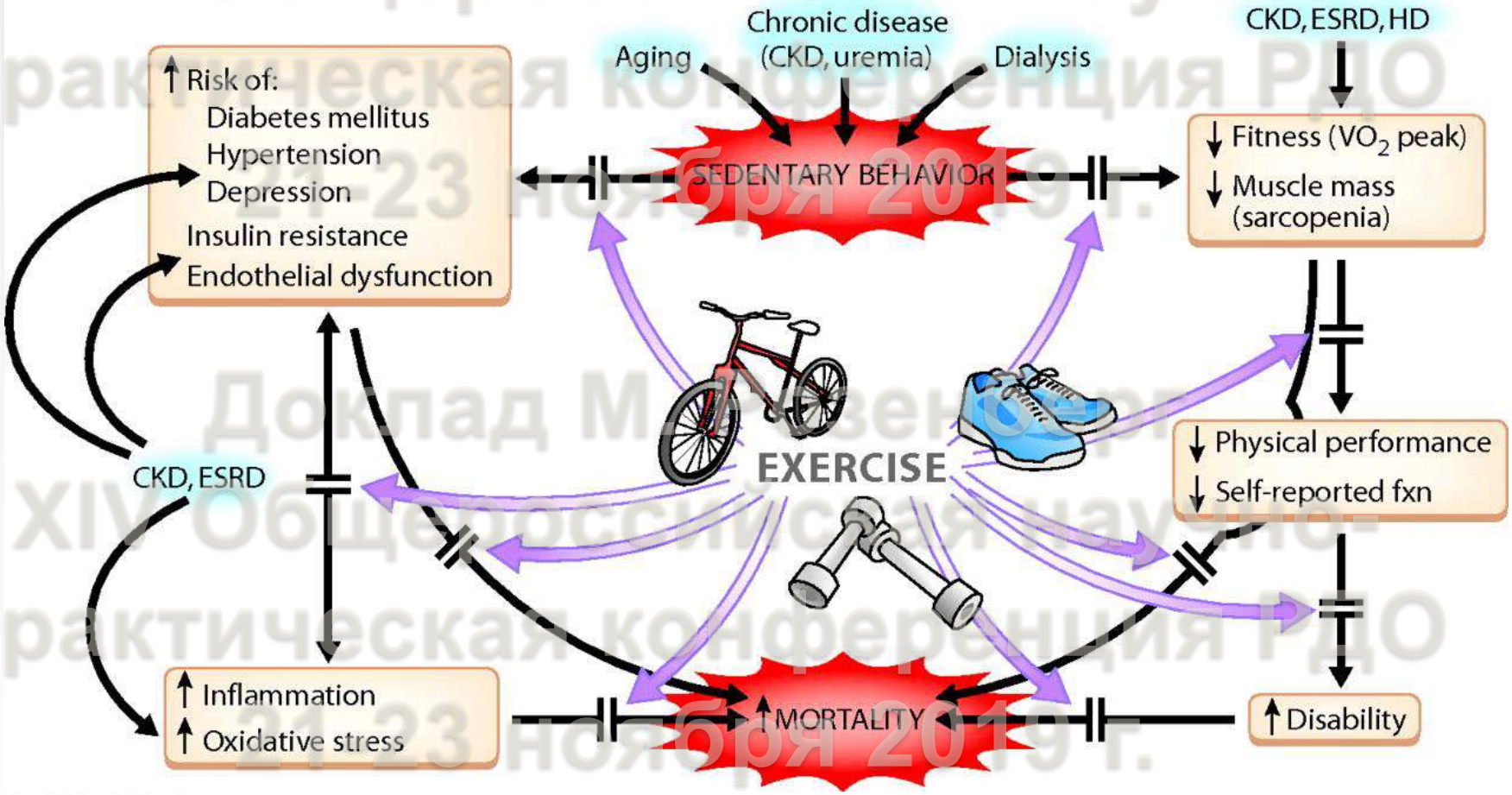
Recommendations for patients with CKD

	Treatment goal	Comments
Smoking cessation	Smoking cessation (1D)	Ample level evidence is available of the benefits of smoking cessation for reduction in cardiovascular risk in the general population. In CKD smoking is associated with disease progression,[49] although no specific data support cessation of smoking to delay CKD progression
Dietary sodium reduction	Lowering intake to <2 g (<90 mmol) sodium daily (corresponds to <5 g salt) (1C)	Individuals with CKD should receive expert dietary advice and information in an educational programme tailored to the severity of CKD and required interventions on salt, phosphate, potassium, and protein intake (1B). Dietary sodium restriction might enhance the effects of ACE inhibitors and ARBs to lower albuminuria and prevent CKD progression[50–53]
Dietary protein restriction	Lowering of protein intake to 0·8 g/kg of ideal bodyweight daily in adults with diabetes (2C) or without diabetes (2B) and eGFR <30 mL/min per 1·73m^2	A high protein intake (>1·3 g/kg of ideal bodyweight daily) should be avoided in adults with CKD and at risk of progression (2C). Individuals with CKD should receive expert dietary advice and information in an educational programme, tailored to the severity of CKD and required interventions on salt, phosphate, potassium, and protein intake (1B)
Weight management	Achievement of BMI 20–25 kg/m^2, according to country-specific demographics (1D)	–
Physical activity	Encourage physical activity compatible with cardiovascular health and tolerance, aiming for at least 30 min five times per week (1D)	A 13% reduction of all-cause mortality was found among patients with CKD who did the minimum amount of exercise (average 15 min of moderate intensity) compared with those who did no exercise at all. The effect is expected to be much greater when patients undertake 30 min of exercise five times per week[54]

Each recommendation is graded (1, recommended; 2 suggested; no number, not graded) and the quality of the supporting evidence is rated (A, high; B, moderate; C, low; D, very low), according to guidelines.[4,55,56] CKD=chronic kidney disease. ACE=angiotensin-converting enzyme. ARBs=angiotensin-receptor blockers. eGFR=estimated glomerular filtration rate. BMI=body-mass index.

Data source: *Gansevoort R, et al. Lancet 2013; 382: 339–52*

Effects of physical activity



Data source: *modified from Johansen KL JASN 2007;18*

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Treatment and rehabilitation strategies of progressive CKD

1. Renin-angiotensin system blockade
2. Blood pressure control
3. Reduction of proteinuria
4. Nutritional counselling – (*Kiisk L et al*)
5. Control of blood glucose in diabetes
6. Control of the blood lipids and lowering the excess weight
7. Treatment of hyperphosphatemia
8. Correction of anaemia
9. Cessation of smoking
10. Exercise therapy is an important part of complex rehabilitation
    (*Pechter et al. Nephrol Dial Transplant, 2003*
    Int J Rehabil Res, 2003, Int J Rehabil Res, 2014)
11. Life quality assessment

Physical inactivity

* One of the most well known risk factors for the atherosclerosis

* Exercise therapy is an important part of complex rehabilitation for cardiovascular disease patients

* Among other non-pharmacological approaches, aerobic exercise could be encouraged more often also for CKD patients to optimize their functional capacity as early as possible

Limitations of the use of exercise

- Patients with CKD have usually limited exercise tolerance, they are not motivated to physical activity
- CKD patients have uremic symptoms that cause poor functional ability and lack of energy and deconditioning is more pronounced among older individuals
- Therefore, exercise should be started as early as possible to postpone further worsening of physical conditioning

Problems of the use of exercise – renal dysfunction

- exercise induces decrease in renal blood flow
- during exercising RAS is activated, which contributes to increased renal vascular resistance
- constriction of renal blood vessels due to the increase of renal sympathetic activity

Effect of aquatic exercise

- Beside of wide variety of aerobic exercise possibilities, aquatic exercise is a novel approach in CKD patients exercise therapy

- Water-based aerobic exercise program could allow older and obese patients to gain all the advantages of land-based exercise more easily

- Water immersion causes increase in renal blood flow and contributes the lowering in renal sympathetic nerve activity, so ameliorating the aggravating effects of exercise on renal function

Aim

to investigate the impact of the aquatic exercise in CKD patients on:

* **cardiopulmonary functional capacity**
* **blood pressure**
* **renal functional parameters**
* **serum lipids**
* **lipid peroxidation status**
* **patient-side subjective value of health**

Data source: Pechter et al. NDT, 2003; Int J Rehabil Res, 2014

Patients

- 17 sedentary moderate CKD pts without anemia
- 7 males, 10 females, age range 31–72 years
- Clinical diagnoses:
  - diabetes mellitus type I (n=2)
  - diabetes mellitus type II (n=2)
  - chronic glomerulonephritis (n=9)
  - chronic pyelonephritis (n=1)
  - essential hypertension (n=3)
- 11 patients had mild cardiovascular problems (NYHA I–II)
- 6 patients had BMI over 30, in 9 patients BMI was 24-30 and 2 patients had BMI less than 24.

Aquatic exercise performance

* The group exercised vertically in the pool with immersion to the shoulder (at water temperature +24–26º) involving rhythmic movements with joints and body (aerobic exercise)

* Duration of the study: twice a week for 12 weeks

Aquatic exercise performance

- **Exercise program (30 min)**
  -10 min warm-up period with gentle stretching
  -10 min cardiovascular segment of exercises with gradually increasing intensity
  -10 min cool-down period with a final stretching time

*** All group exercised at low-intensity (40–50 % of their individual maximal oxygen uptake - VO_2max)**

Methods: cardio-respiratory functional capacity

- Cardiopulmonary exercise testing was performed at baseline and after follow-up period.

- Individual maximal oxygen uptake (VO_2max, ml/kg/min), oxygen pulse (ml/heartbeat/min) and peak load (W) were measured at anaerobic threshold using cycle ergometer with stepwise increasing workload by 10 W per minute

Methods: cardio-respiratory functional capacity

- VO_2max was determined considering the criteria described by K. Wassermann (1999)

Methods : Serum lipids and renal functional parameters

* Lipids
  - serum total cholesterol (S-Chol, mmol/l)
  - triglycerides (Tg, mmol/l)
  - HDL- and LDL-cholesterol (mmol/l)

* Renal functional tests
  - serum-creatinine (S-Crea, µmol/l)
  - urinary protein excretion (U-prot, g/24h)
  - glomerular filtration rate (eGFR, ml/min)
  - S-cystatin C (particle-enhanced turbidimetric assay, DAKO)

Methods : Lipid peroxidation status

- **Products of lipid peroxidation (LPO,** nmol/ml)
  - malonaldehyde and 4-hydroxyalkenals together - measured in serum by colorimetric assay for lipid peroxidation (Bioxytech® LPO-586™)

- **Markers of antioxidant status:**
  - concentrations of total glutathione (TGSH) incl. reduced (GSH) and oxidized forms (GSSG, all in µmol/ml) - assessed by an enzymatic method (Griffith 1980)

Methods : General health status

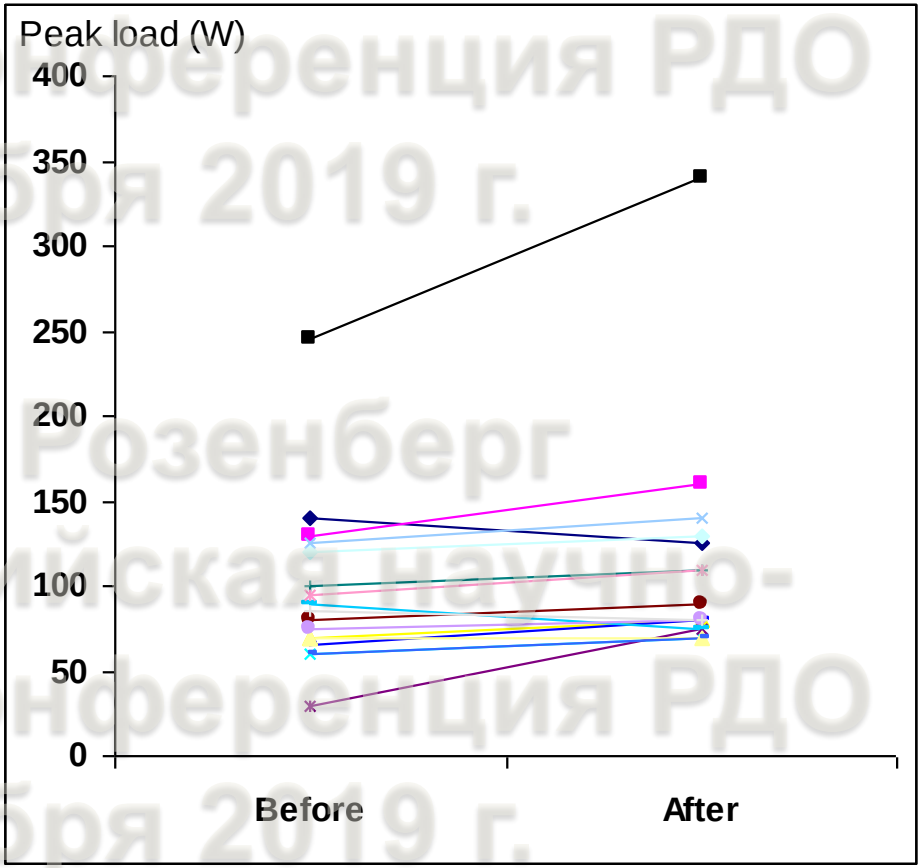
Patient-side subjective value of general health status was characterized using numerical values from 1 to 10 and was interpreted as following:

- points 8–10 = good;
- points 4–7 = average (so-so);
- points 1–3 = poor.

Results : Cardiopulmonary parameters

- Changes of indices of cardiopulmonary reserve and physical capacity showed improvement in all parameters

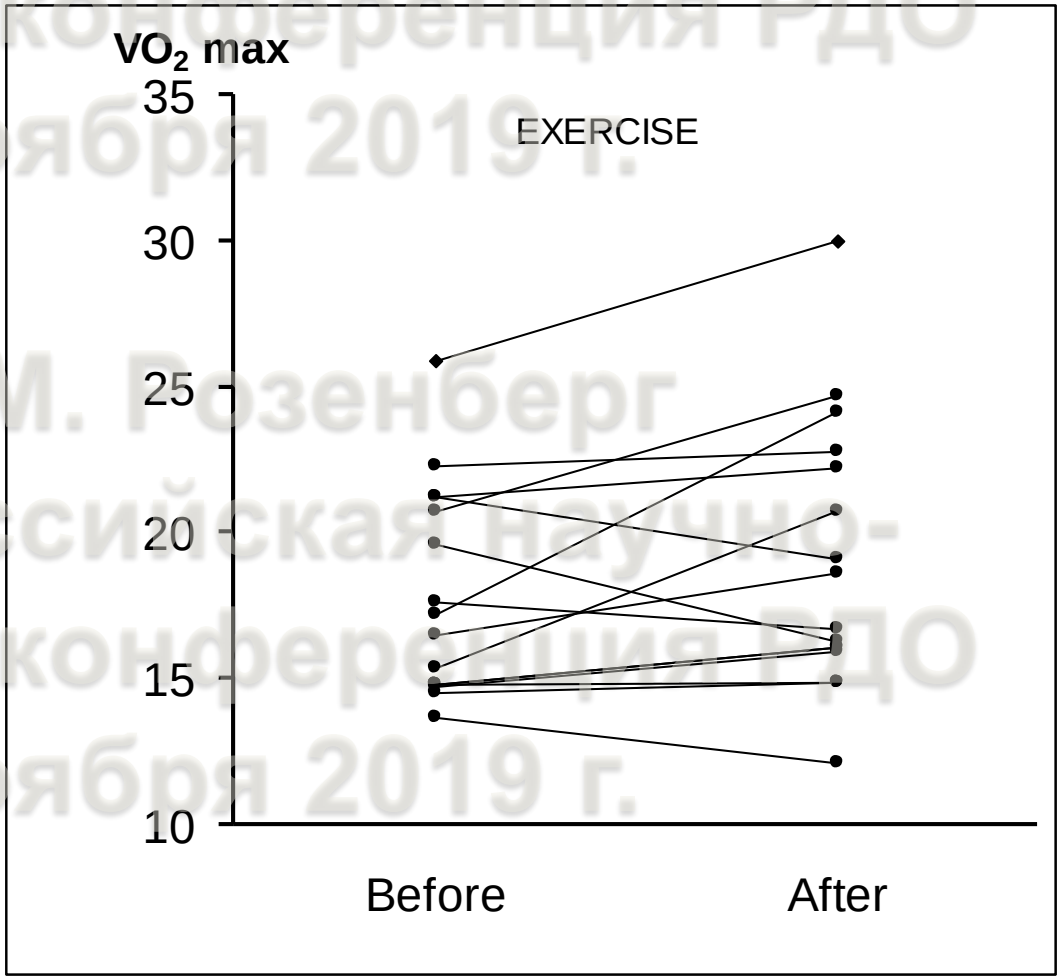
- Peak load (W) was significantly improved when compared with results before and after the rehabilitation program



Data source: Pechter et al. NDT, 2003; Int J Rehabil Res, 2014

Results I: Cardiopulmonary parameters – maximal oxygen uptake

- 13 out of 17 patients improved their peak VO_2 values (ml/kg/min)
- Blood pressure was significantly lower after the study period



Results : renal parameters

Proteinuria diminished significantly and eGFR improvement was reinforced by significant S-Cystatin C decrease

	U-prot (g/24h)	S-Crea (µmol/l)	S-CysC (mg/l)	eGFR ml/min
Baseline	0.7±0.2	141.8 ±11.7	1.7±0.2	62.9±5.9
Follow-up	0.4±0.2 *	135.3 ±10.4	1.4±0.1*	67.1±7.0

** p<0.05 follow-up vs. baseline*

Results: Ox. stress parameters

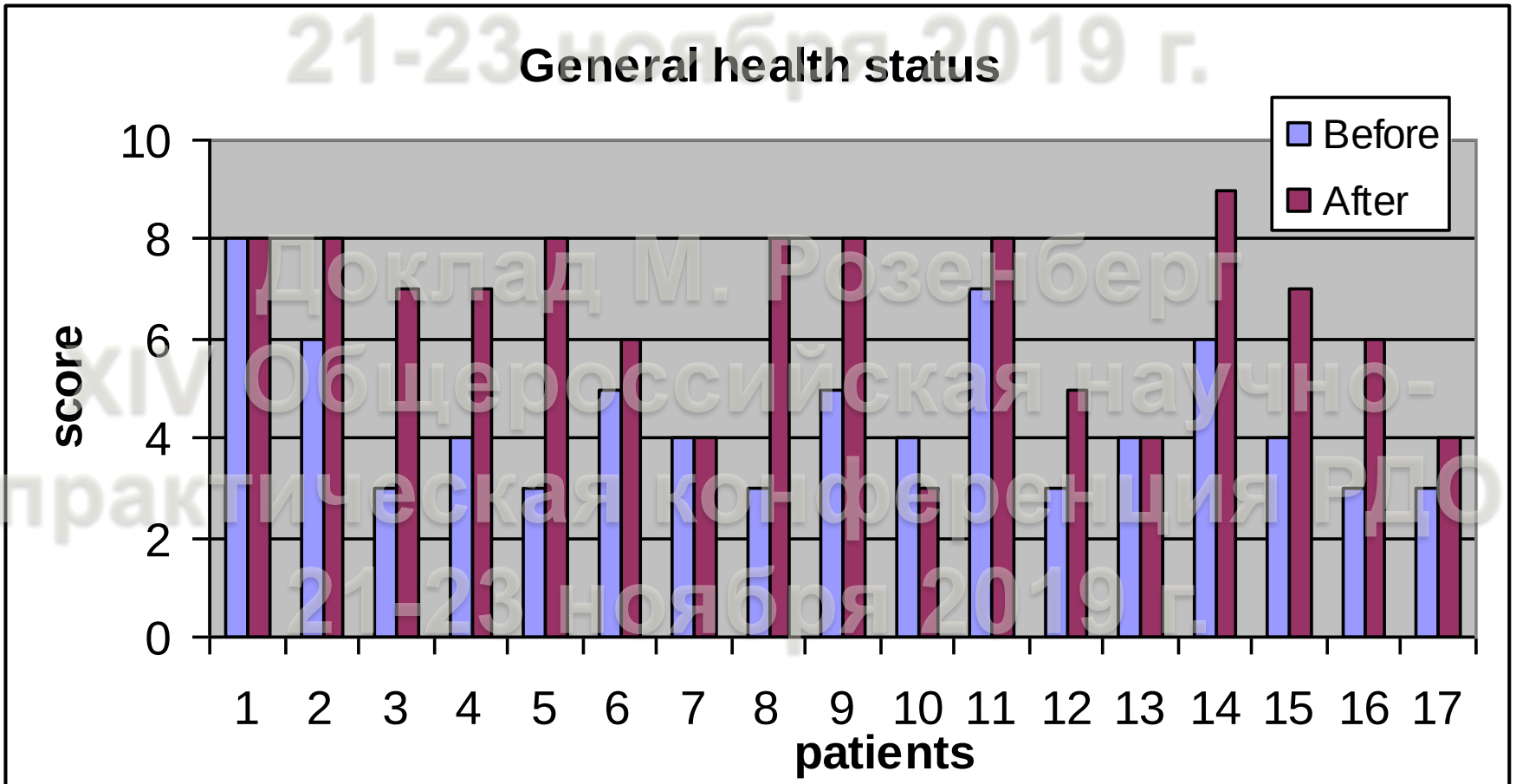
- LPO status lowered significantly, reduced glutathione (GSH) level increased significantly, positive changes are noted in redox ratio (oxidised glutathione/ reduced glutathione)

	LPO (ng/ml)	TGSH	GSSG	GSH	GSSG/ GSH
Baseline	1.5±0.2	789.9 ±53.3	75.5 ±12.1	751.2 ±46.8	0.1±0.0
Follow-up	1.0 ±0.1*	790.0 ±49.9	56.8 ±9.4	864.2 ±44.5*	0.1±0.0

**p<0.05 follow-up vs. baseline*

Results: General health

Patients estimated the rehabilitation program and their subjective value of the general health status was improved



Conclusion

Individually dosed and well-counseled regular low-intensity aquatic exercise, blood pressure control, encouragement and education could:

*** improve the cardiorespiratory functioning**

*** lower the blood pressure**

*** stabilize the renal function of CKD patients for longer period of time preventing premature atherosclerosis and improving fitness and quality of life.**

Data source: Regular aquatic exercise for chronic kidney disease patients and a ten-year follow-up study (*Pechter et al. Nephrol Dial Transplant, 2003; Int J Rehabil Res, 2014)*

Conclusion

In ten years of follow-up time we found that nobody from the aquatic exercise group reached study endpoint.

But in ten years 55% of the sedentary control group reached dialysis or death. Occurrence of study endpoint was statistically significantly different between the study groups.

Data source: Regular aquatic exercise for chronic kidney disease patients: a ten-year follow-up study (*Pechter et al. Int J Rehabil Res, 2014)*

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PHYSICAL ACTIVITY AND QUALITY OF LIFE IN PATIENTS WITH CHRONIC KIDNEY DISEASE:

A CROSS-SECTIONAL STUDY IN ESTONIA

Ülle Pechter, Jana Uhlinova, Kaja Põlluste, Margus Lember, Annika Aart, Riina Kallikorm, Mart Kull, Kati Kärberg, Raili Müller, Anni Tolk, Mai Rosenberg

Tartu University, Department of Internal Medicine, Estonia

Background:

• CKD patients can benefit enormously in their daily life if they receive appropriate support and advice for self-care and lifestyle regimens from their health care professionals

• Finding associations between health-related quality of life (HRQoL) and lifestyle behaviours may help to demonstrate the importance of lifestyle modifications in slowing the progression of CKD and ameliorating HRQoL

A CROSS-SECTIONAL STUDY IN ESTONIA
PHYSICAL ACTIVITY AND HRQoL IN PATIENTS WITH CKD

We conducted a comparative study to evaluate the HRQoL in different chronic diseases.

Hypothesis

patients with low kidney function (category G3b-G5) will report about noticeably lower health quality and PA levels in everyday life in comparison with CKD pts with higher kidney function and/or pts with other chronic conditions (CC).

Data source: *Pechter Ü, et al. Baltic Nepheology Conference 2016, IJKD 2019 (Submitted)*

A CROSS-SECTIONAL STUDY IN ESTONIA PHYSICAL ACTIVITY AND HRQoL IN PATIENTS WITH CKD

General aim:

to assess HRQoL and physical activity (PA) in patients with CKD.

Specific aims

to assess and compare self-reported PA, smoking status, alcohol consuming differences and health-related quality of life (HRQoL) firstly between CKD patients groups with below (CKD low group) and above eGFR 45 ml/min (CKD high group)

to compare CKD patients groups mean data with other chronic conditions (CC) patient's group data and with subjects without CC with respect to age, gender and body mass index (BMI).

Data source: *Pechter Ü, et al. Baltic Nepheology Conference 2016, IJKD 2019 (Submitted)*

Methods:

Design: cross-sectional

Patients: 705 consecutive pts (294 male and 411 female, age range 20–88 years) at primary health care centres and the university hospital assessed HRQoL through SF-36 and PA level (MET-mins/week) by International Physical Activity Questionnaire (IPAQ)

Studied parameters: Patient's age, gender, education, BMI, smoking and alcohol consumption status were used as independent variables - to assess PA and the physical (PCS) and mental component score (MCS) of HRQoL.

Data source: *Pechter Ü, et al. Baltic Nepheology Conference 2016, IJKD 2019 (Submitted)*

Methods:

Patient groups:

- CKD pts with eGFR > 45 and < 45 ml/min were divided to evaluate different stages of CKD separately.

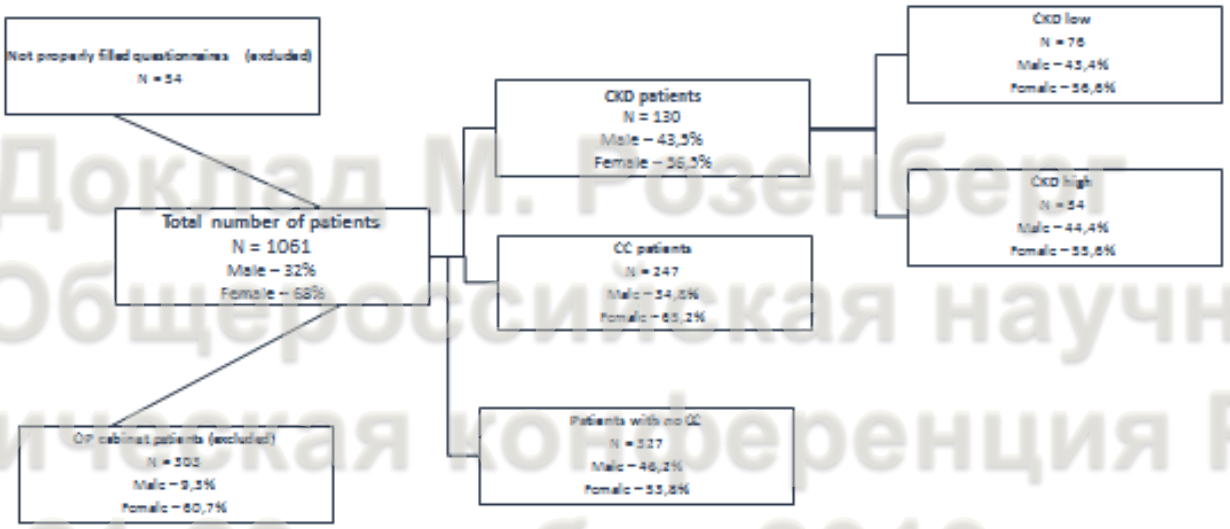
- Chronic conditions (CC) study group consisted of pts having one or more other CC (osteoarthritis, chronic back pain, rheumatoid arthritis, 2 type diabetes, cardiovascular disease)

- control patients without CC.

Data source: *Pechter Ü, et al. Baltic Nepheology Conference 2016, IJKD 2019 (Submitted)*

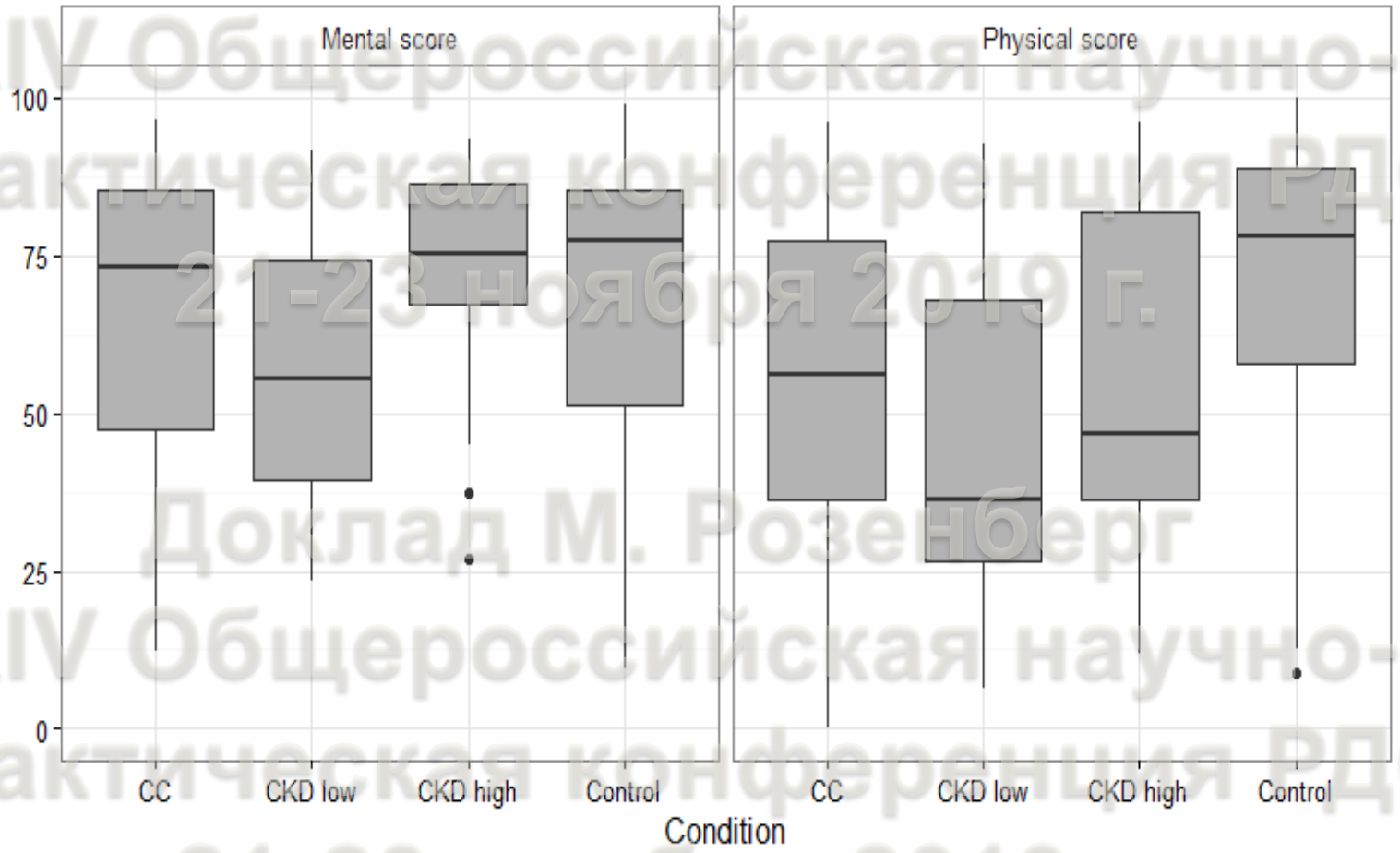
Methods:

A consort diagram to show participant flow through study.



Data source: *Pechter Ü, et al. Baltic Nepheology Conference 2016, IJKD 2019 (Submitted)*

Results



CKD pts with eGFR< 45 ml/min had significantly lower HRQoL scores (both MCS and PCS) compared with other groups (p = 0.0000).

Data source: *Pechter Ü, et al. Baltic Nepheology Conference 2016, IJKD 2019 (Submitted)*

Results:

- HRQoL scores (both PCS and MCS) were strongly influenced by age and education but not by PA level in CKD pts.
- There was no statistically significant differences in distribution of PA levels between CKD and CC pts (p = 0.08) as well between CKD pts and controls (p = 1.0), adjusted to age, gender, education.
- No differences in PA when compared CKD pts with eGFR > 45 and < 45 ml/min (p = 1.0) were found.
- Interestingly, in the patients with eGFR < 45ml/min who reported about good walking habits we found it statistically significantly connected with higher PCS (p = 0.0000).

Data source: *Pechter Ü, et al. Baltic Nepheology Conference 2016, IJKD 2019 (Submitted)*

Conclusion

CKD pts with eGFR < 45 ml/min value their mental and physical life quality significantly lower as pts with eGFR > 45 ml/min, pts with CC or control pts.

PA level according to IPAQ is similar among CKD pts irrespectively of the kidney function.

Walking impacts positively life quality in CKD patients with eGFR < 45ml/min.

Data source: *Pechter Ü, et al. Baltic Nepheology Conference 2016, IJKD 2019 (Submitted)*

Conclusion

- The PA level of CKD patients is significantly lower and they scored their HRQoL significantly worse in comparison with patients with other CC.
- It is notable that among the subjects with impaired kidney function (eGFR<45 ml/min) walking habits play an important role in HRQoL.
- Higher PA levels had no significant impact on quality of life scores in CKD pts. Smoking and harmful alcohol use was not prevalent in observed CKD population.
- We suggest that during pre-dialysis care quality of life and PA should be assessed regularly to impair the management of CKD pts.

Data source: *Pechter Ü, et al. Baltic Nepheology Conference 2016, IJKD 2019 (Submitted)*

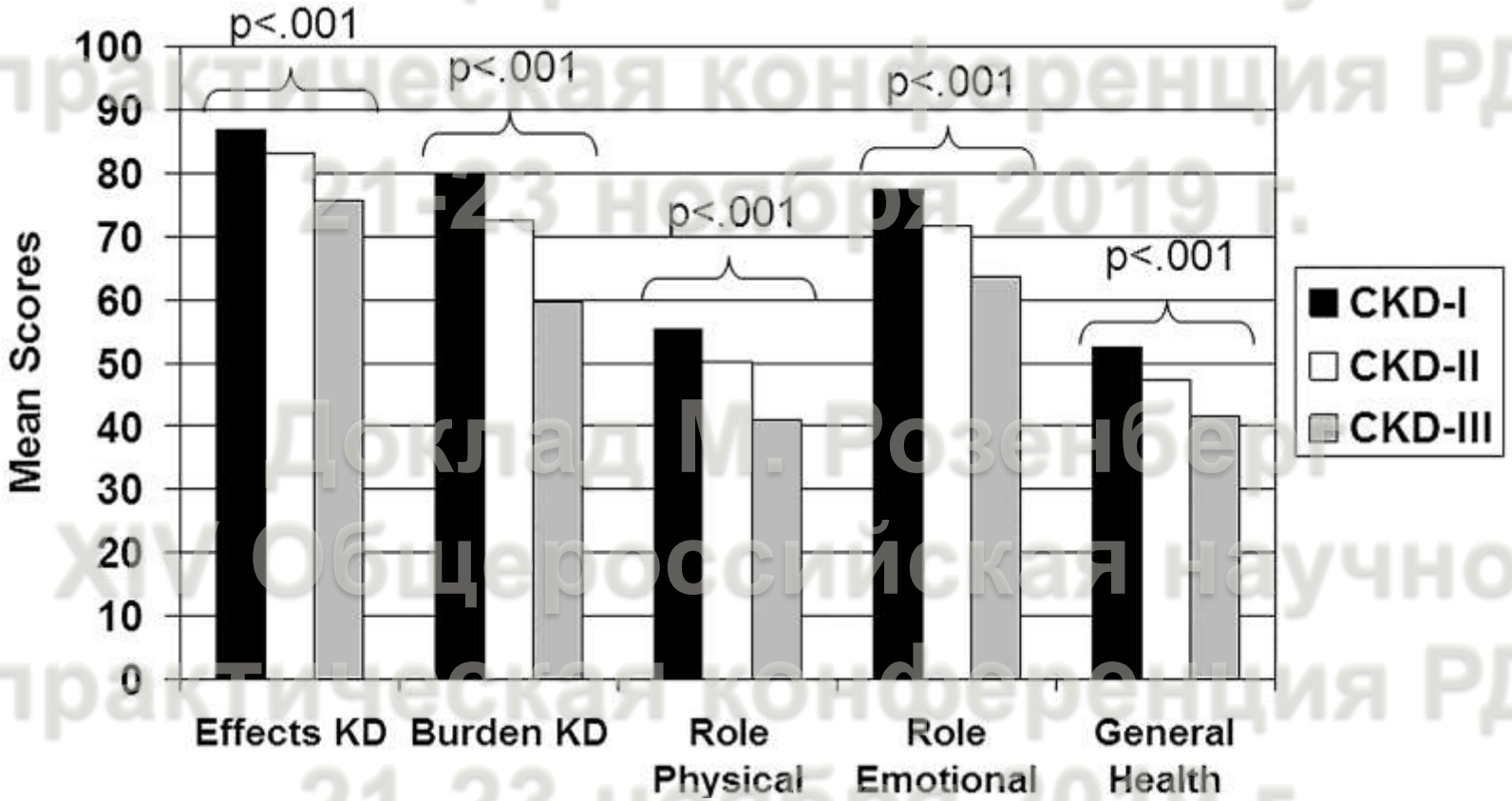
Physical and mental component scores in CKD

	SF-12 physical component scale score (PCS)		SF-12 mental component scale score (MCS)	
	crude	adjusted*	crude	adjusted*
GFR ml/min/1.73 m^2				
>90	46.9	40.9	51.1	49.4
60–89	47.4	41.2	52.6	49.9
45–59	42.8	39.4	52.4	49.6
30–44	42.7	39.9	52.9	50.1
15–29	37.9	37.3	51.0	48.6
	p = 0.0001	p = 0.0001	p = 0.1595	p = 0.1600

Data source: McClellan VM, et al.Am J Nephrol2010;31(4):309-17

Physical and mental component scores in CKD

Examples of several domains of the health-related quality of life (HRQOL) showing progressive decline in scores with the more advanced stages of CKD (1186 pts)



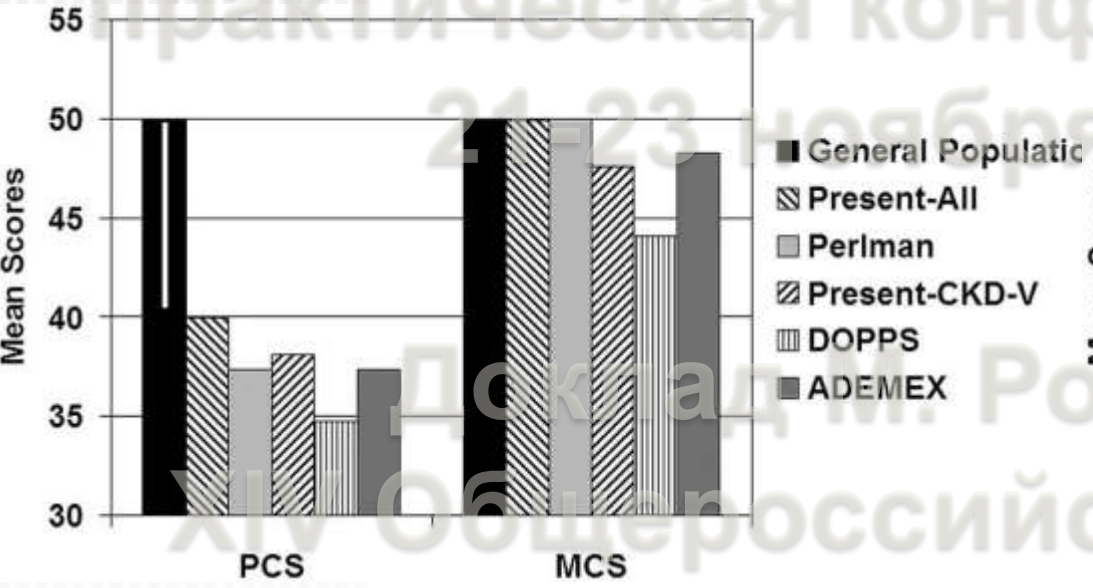
Baseline measures of HRQOL were reduced in proportion to the severity grade of CKD. Physical functioning score declined progressively with more advanced stages of CKD

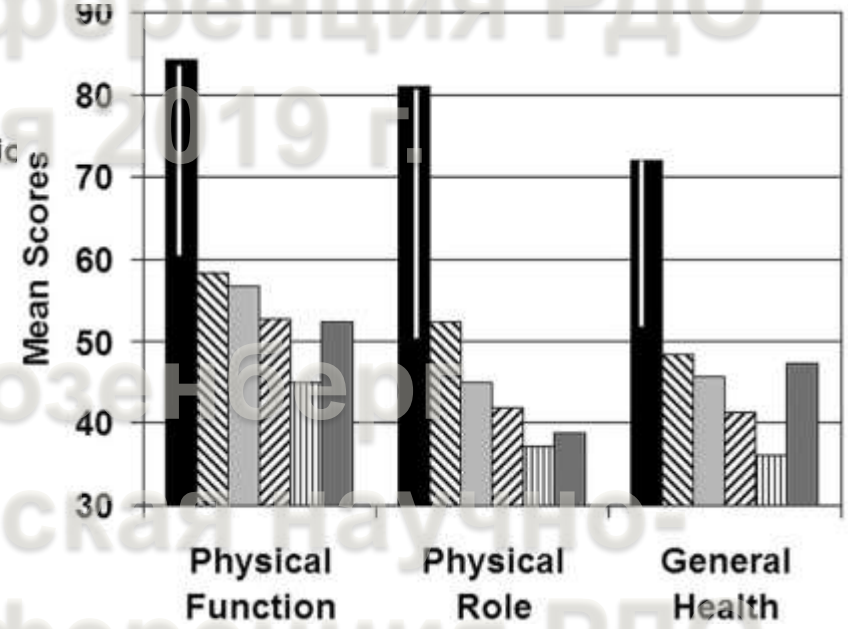
Data source: Salim K. Mujais et al. CJASN 2009;4:1293-1301

CJASN

Physical and mental component scores in CKD

PCS scores in CKD V in the study were higher than those of HD patients in DOPPS, but similar to those of PD patients in ADEMEX





MCS scores in the study were not much different from the general population scores or those observed by Perlman et al. Values in CKD V subjects were similar to those in ADEMEX

Data source: Mujais S et al. CJASN, 2009; 4: 1293–1301

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ERA-EDTA congress 2017

PHYSICAL ACTIVITY AMONG NEPHROLOGISTS, RESIDENTS AND NURSES

Ülle Pechter [1], Naomy Clyne [2], Mai Ots-Rosenberg [1]
[1] Tartu University, Department of Internal Medicine, Estonia, [2] Lund University, Sweden

Background and Aim

Patients with chronic kidney disease (CKD) have elevated cardiovascular disease (CVD) risk. Physical activity (PA) is known as an independent CVD risk factor, and despite the fact that current clinical practice guidelines recommend PA for CKD patients, PA is obviously rarely addressed by renal care teams.

The aim of this observational cross-sectional survey was to assess physicians and renal nurses' opinion about the importance of PA counselling among other determinants of healthy life-style.

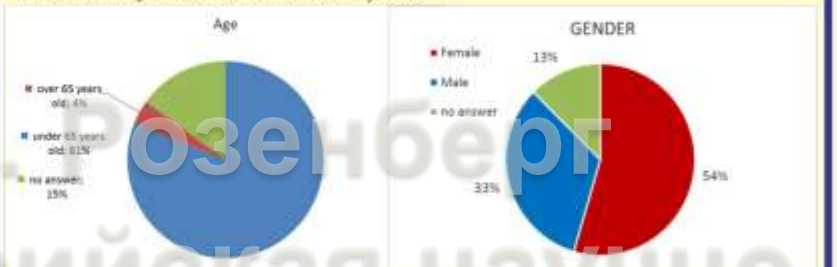
Our hypothesis was that nephrologists and renal nurses who are physically active ask patients about PA more often and advise them to be physically active.

Methods

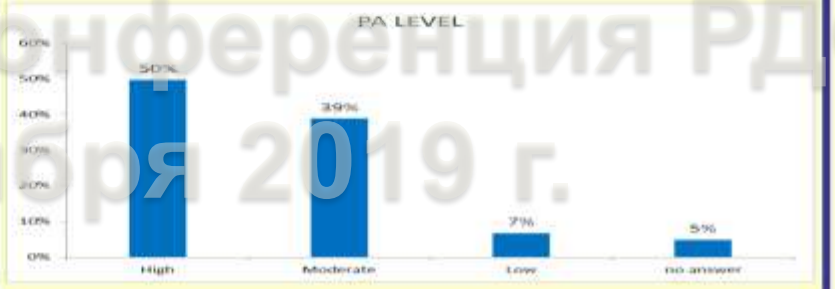
The level of physical activity in metabolic units per week (MET, min/week) was calculated on the basis of the IPAQ (International Physical Activity Questionnaire). The International Physical Activity Questionnaire (IPAQ) short form was opted to assess physical activity because of its relatively good reliability and

Results

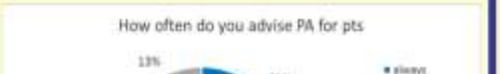
In total, 374 questionnaires were analysed.



According to IPAQ nephrologists, residents and renal nurses are physically active, 50% reported of high activity level.



60% of the responders recommend PA to CKD pts



PHYSICAL ACTIVITY AMONG NEPHROLOGISTS, RESIDENTS AND NURSES

ERA-EDTA 54 congress 2017

Ülle Pechter[1], Naomi Clyne[2], Mai Ots-Rosenberg[1]
[1] Tartu University, Department of Internal Medicine, Estonia, [2] Lund University, Sweden

HYPOTHESIS

nephrologists and renal nurses who are physically active ask patients about physical activity more often and advise them to be physically active

Доклад М.Розенберг
XIV Общероссийская научно-практическая конференция РДО
21-23 ноября 2019 г.

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THE AIM

of this observational cross-sectional survey

- to find PA status among European (incl. Baltic) nephrologists and renal nurses and the relation with counselling

- to assess physicians and renal nurses' opinion about the importance of PA counselling among other determinants of healthy life-style.

- to identify PA counselling activity

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METHODS

Voluntary, anonymous survey consisted of the information about physicians or nurses age, gender, body weight and PA counselling activity.

Questions about lifestyle counselling consisted of the regular PA, smoking cessation, alcohol restriction, healthy diet.

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METHODS

Questionnaires were distributed:

- 12th Conference of Baltic Societies of Nephrology 2014
- ERA-EDTA Flash – SurveyMonkey 2015

  (We wrote this request as an official request from EURORECKD as a EURORECKD activity)
- ERA-EDTA congress 2015
- members of the Nordic PD Council and their dept.-s
- Nephrology dept.-s in the Southern Region of Sweden

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SURVEY

1. personal data

- nephrologist/nurse/nephrology resident
- Age
- Gender
- BMI
- Smoking
- Physical activity

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SURVEY

2. Center

- PD pt nr in your center: less than 20, 20-39, 40-59, more than 60
- HD pt nr: less than 30, 30-49, 50-69, more than 70
- Availability of dedicated physiotherapist in center

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SURVEY

3. Counselling

- Ranking of importance of PA for CKD, PD, HD, KT pts
- Do you counsel of your patients about PA (rarely, some-time, often, always)
- Ranking of PA among other healty life-style (%): smoking, obesity, alcohol, healthy diet,
- Referral to physioterapist in center

PHYSICAL ACTIVITY AMONG NEPHROLOGISTS, RESIDENTS AND NURSES

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The level of physical activity in metabolic units per week (MET, min/week) was calculated on the basis of the IPAQ (International Physical Activity Questionnaire).

IPAQ short form was opted to assess physical activity because of its relatively good reliability and validity.

The IPAQ short version estimates how much health enhancing PA, including daily life activities and exercise, the person has undertaken over the previous 7 days, divided into three intensities.

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The individual had to estimate how many days (frequency) he/she was physically active and the average time (duration) that he/she spent being physically active on these days.

Total PA (MET min/week) was calculated, as suggested in the Guidelines for Data Processing and Analysis of the IPAQ for the sum of three intensities: walking, and moderate, and vigorous PA.

IPAQ References:

Craig CL, Marshall AL, Sjostrom M, Bauman AE, Booth ML, Ainsworth BE, Pratt M, Ekelund U, Yngve A, Sallis JF *et al*: International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc* 2003, 35(8):1381-1395.

Painter P, Marcus RL: Assessing physical function and physical activity in patients with CKD. *Clin J Am Soc Nephrol* 2013, 8(5):861-872.

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RESULTS

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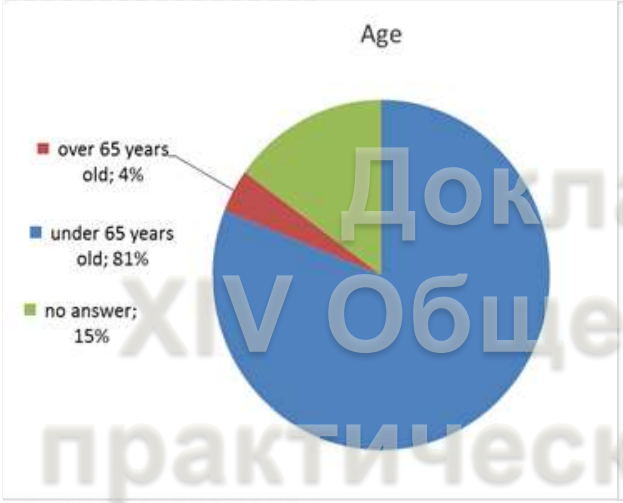

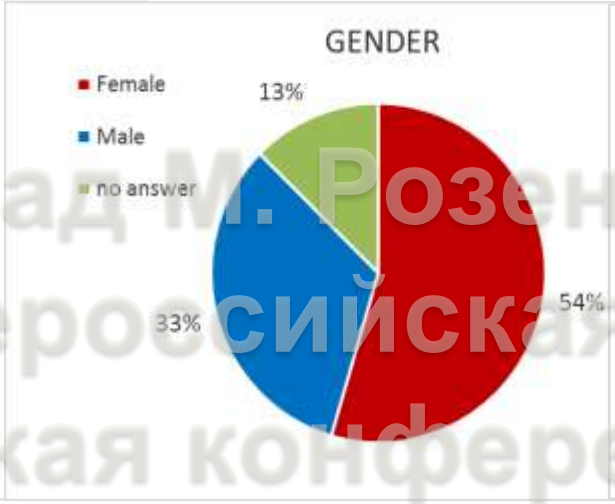

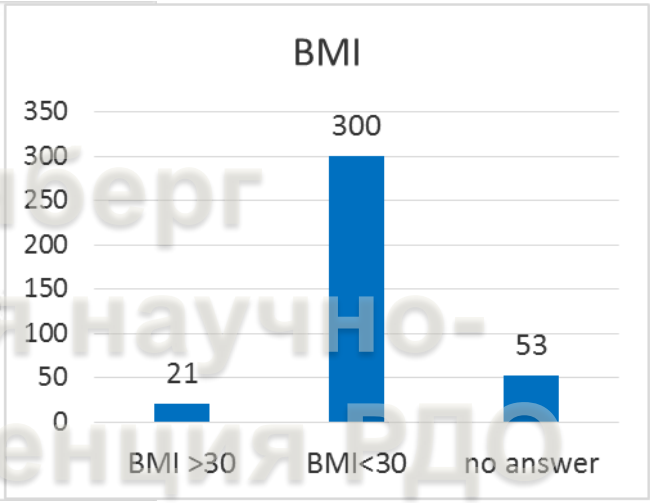

PHYSICAL ACTIVITY AMONG NEPHROLOGISTS, RESIDENTS AND NURSES

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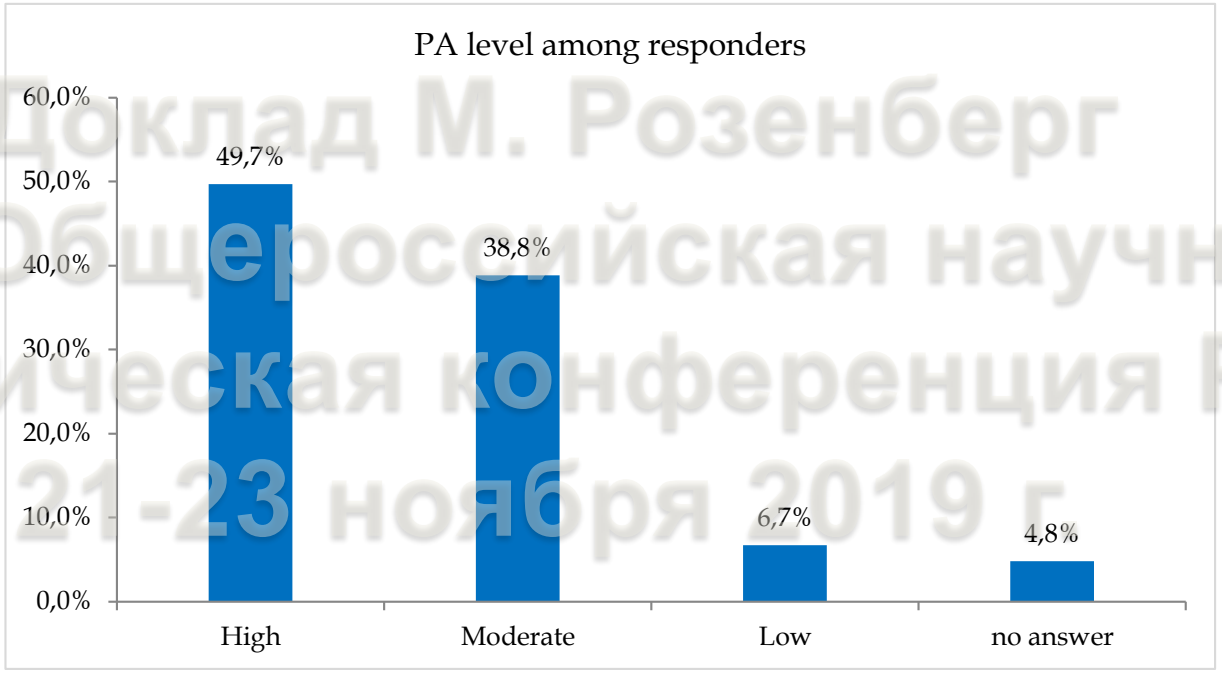
[1] Tartu University, Department of Internal Medicine, Estonia, [2] Lund University, Sweden

RESULTS

PA status during random week: According to IPAQ nephrologists, residents and renal nurses are physically active, 50% reported of high activity level.



PHYSICAL ACTIVITY AMONG NEPHROLOGISTS, RESIDENTS AND NURSES

ERA-EDTA 54 congress 2017

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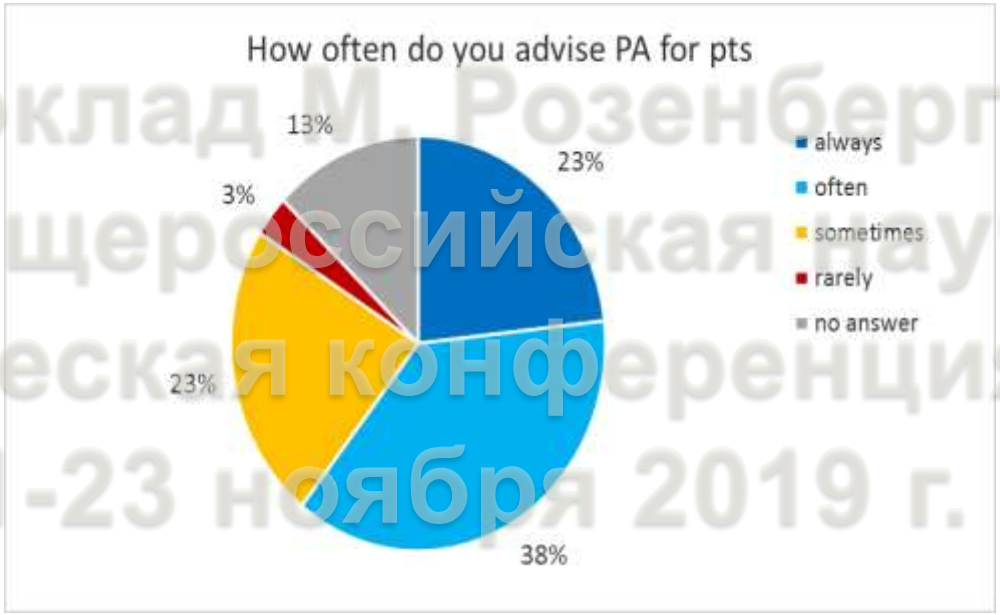
[1] Tartu University, Department of Internal Medicine, Estonia, [2] Lund University, Sweden

RESULTS

PA councelling: 60% of the responders recommend PA to CKD patients always or often.



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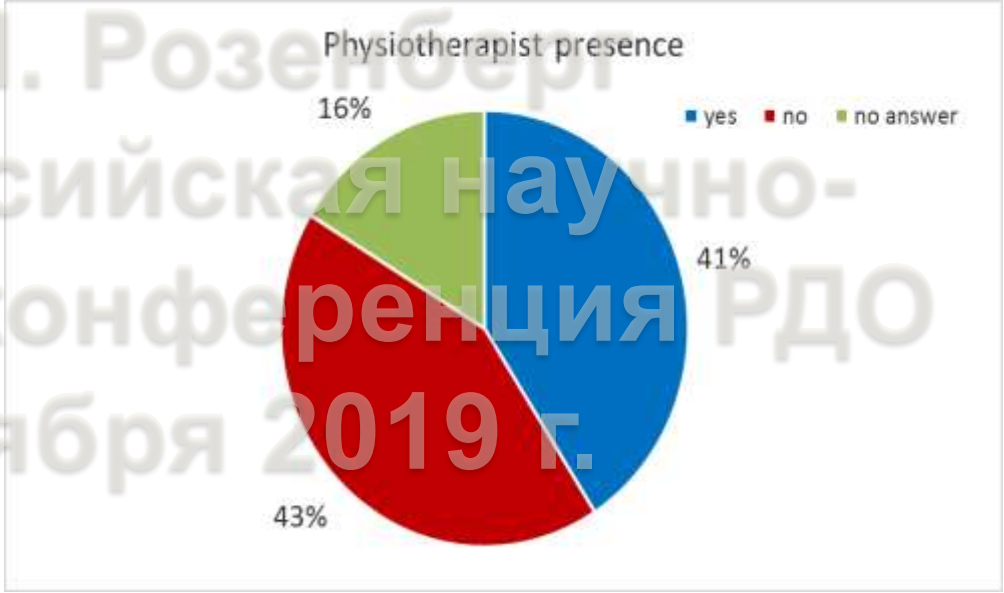
RESULTS

Center data:
63% are working in a HD center with 50 or more pts

IPAQ questionnaire may deliver subjective insights of PA

Recommendations may depend also of the presence of physioterapist in the centre (Physioterapist in center - 41%)



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RESULTS

- Statistically significant relations were not found between:
  - PA and age
  - PA and gender
  - PA and country
  - PA and BMI

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RESULTS

PA counselling had significant relations between (ANOVA):

- PA counselling and PA (p=0.00696)
- PA counselling and age (p<0.0001)
- PA counselling and physioterapeutist presence in center (p=0.00032)
- PA councelling and big center (p=0.00995)

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CONCLUSION

Among nephrologists physical acivity level is high

Nephrologists counsel CKD patients often.

PA counselling depends significantly of physician age, physician physical activity and the presence of physioterapeutist in the center. In a larger center pts are conselled more often.

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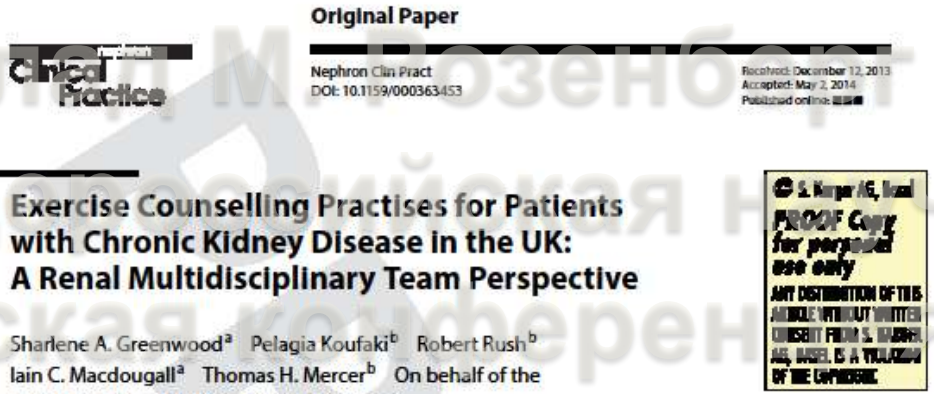
CONCLUSION

Among nephrologists, residents and renal nurses physical activity level is high and they counsel CKD patients often.

PA consulting depends significantly of physician or nurse age, physical activity and the presence of physioterapeutist in the centre.

Greenwood SA et al „Exercise Counselling Practices for Patients with CKD in the UK: a Renal Multidisciplinary Team Perspective“ Nephron Clin Pract 2014

- An 18-item online survey questionnaire
- regarding exercise counselling practice patterns was administered to 565 multidisciplinary renal care professionals.



Original Paper

Nephron Clin Pract
DOI: 10.1159/000363453

Received: December 12, 2013
Accepted: May 2, 2014
Published online:

Exercise Counselling Practises for Patients with Chronic Kidney Disease in the UK: A Renal Multidisciplinary Team Perspective

Sharlene A. Greenwood[a] Pelagia Koufaki[b] Robert Rush[b] Iain C. Macdougall[a] Thomas H. Mercer[b] On behalf of the British Renal Society Rehabilitation Network

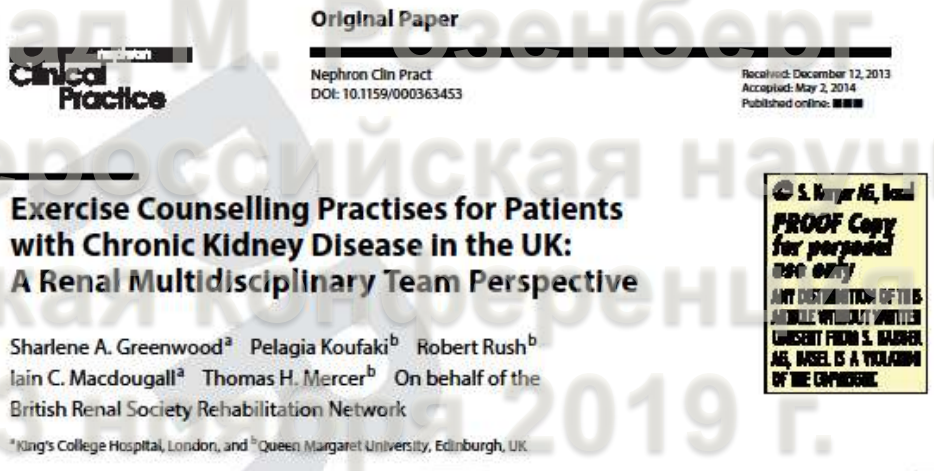
[a]King's College Hospital, London, and [b]Queen Margaret University, Edinburgh, UK

Key Words
Exercise · Counselling · Physical activity · Barriers · Rehabilitation · Chronic kidney disease

cific renal rehabilitation services, including an active PA/exercise component, should be available to all patients ($p < 0.01$). The most commonly reported barriers for the develop-

Greenwood SA et al
„Exercise Counselling Practices for Patients with CKD in the UK: a Renal Multidisciplinary Team Perspective“
Nephron Clin Pract 2014

- 142 individuals (25% response rate) completed the questionnaire.
- 42% of respondents discussed and encouraged PA, but only 18 (11%) facilitated implementation of PA for their patients.



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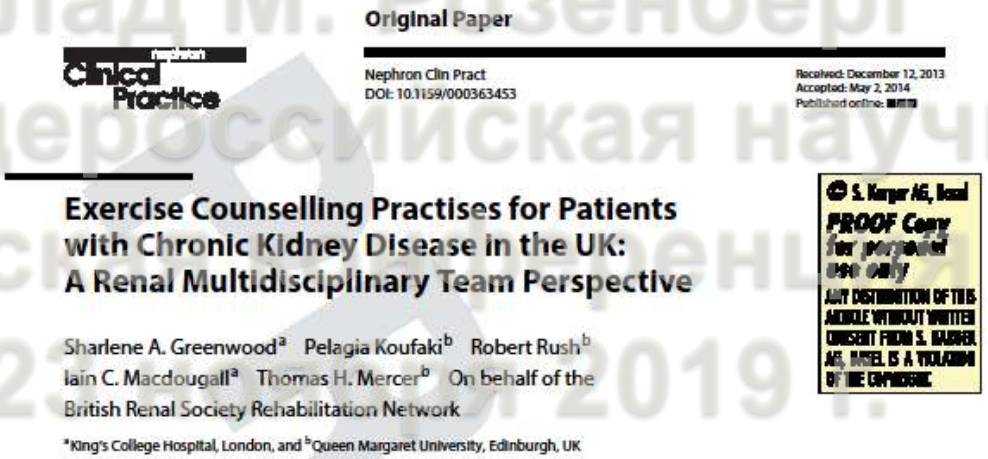
cific renal rehabilitation services, including an active PA/ex-

Greenwood SA et al „Exercise Counselling Practices for Patients with CKD in the UK: a Renal Multidisciplinary Team Perspective“ Nephron Clin Pract 2014

- Nephrologists ($p < 0.003$) were more likely to prescribe or recommend PA compared to professionals with a nursing background
- Nephrologists believed that specific renal rehabilitation services, including an active PA/exercise component, should be available to all patients ($p < 0.01$).



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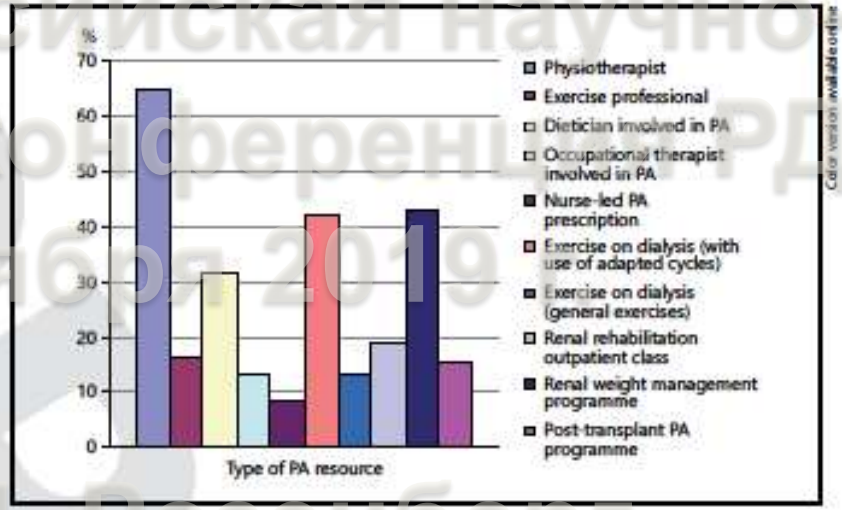


Fig. 1. Distribution of answers to the instruction, 'Please tick as many of the services that are currently available through your unit for patients with CKD', captured from every participant (n = 127) who responded to the survey.

purposes, three groups were formed (nephrologists, nursing staff, and the remaining dietitians, physiotherapists, exercise scientists and miscellaneous). Of the respondents, 133 answered the question about their own PA behaviour, with 35% walking or exercising <3 times/week and therefore not meeting current PA guidelines. Thirty-eight percent walked/exercised >5 days/week (met current PA guidelines), and 27% of those who met the guidelines performed vigorous exercise. Active nephrologist respondents were more likely to counsel their patients on PA ($p < 0.001$).

Discussion

The primary goal of this survey was to document practice patterns and attitudes towards exercise counselling

problems. It is perhaps these patient-centred barriers that the renal MDT respondents' opinions reflect. Still, it remains impossible to fully ascertain this without further patient-focussed research.

Seventy-four percent of the sample from this survey asked patients about PA, and of those respondents 59% asked and counselled, and 42% recommended PA to patients. This level of verbal counselling/recommendation for PA, however, was followed through by 18% of the renal MDT team who referred patients to an exercise professional, by 12% facilitating provision of equipment for patients to exercise on dialysis on a frequent basis and by 11% providing written information about PA (table 2). When assessing these results, one might suggest that the universal belief (table 1) that PA is beneficial for patients with CKD is on the whole not translated into a meaningful PA or exercise prescription to facilitate behaviour

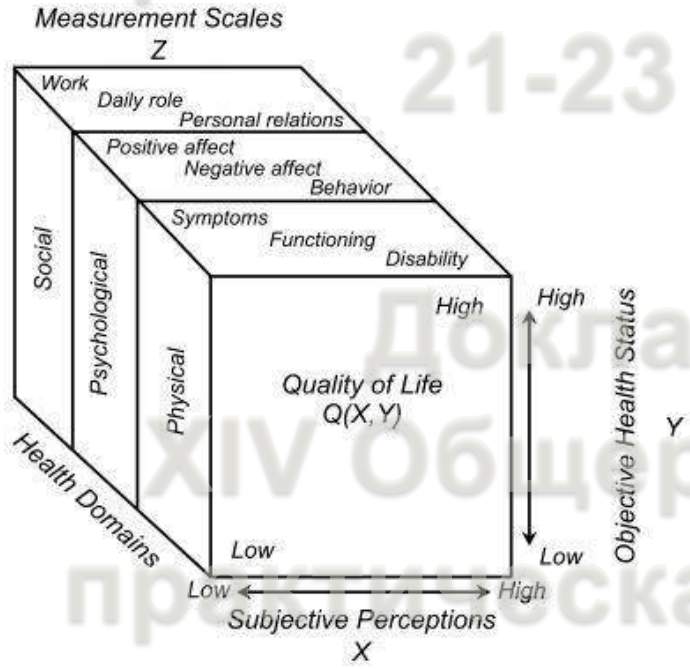
Overview of talk

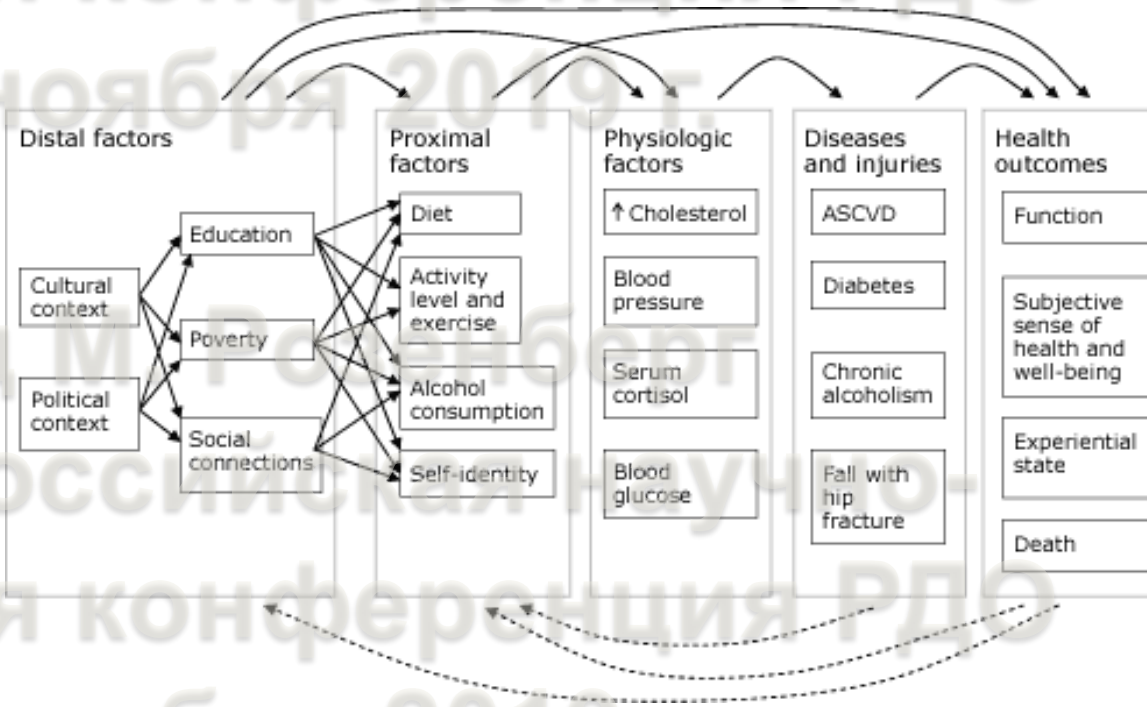
- **Introduction / Background**
- **Our studies:**
  - Regular aquatic exercise for chronic kidney disease patients and a ten-year follow-up study (*Pechter et al. Nephrol Dial Transplant, 2003; Int J Rehabil Res, 2003, Int J Rehabil Res, 2014)*
  - Impact of walking on health-related quality of life scores in patients with chronic kidney disease: A cross-sectional study in Estonia (*Pechter Ü, et al. Baltic Nepheology Conference 2016, IJKD 2019, Submitted)*

  Physical activity among nephrologists, residents and nurses - observational cross-sectional survey (*Posterpresentation, ERA-EDTA 54. congress 2017*)

- **Barriers to utilization of physical activity and renal rehabilitation**
- **Future directions**

Factors influencing HRQoL and health outcomes





TraffordC. UnivBritish Columbia, Vancouver 2013

Parrish RG. PrevChronic Dis2010;7(4):A71.

Greenwood SA et al
„Exercise Counselling Practices for Patients with CKD in the UK: a Renal Multidisciplinary Team Perspective“
Nephron Clin Pract 2014

- The most commonly reported barriers for the development and implementation of PA/exercise options included:
  - lack of funding,
  - lack of time,
  - lack of knowledgeable personnel, such as physiotherapists or other exercise professionals.

Table 3. All emerged themes of barriers to promotion/provision of PA and rehabilitation services in units as reported by 120 respondents

Reported themes of barriers	n (%)
Money/funding	42 (35)
Lack of time	37 (30.8)
Lack of qualified personnel (physio or other exercise professional) for this role	32 (26.6)
Lack of physical resources or difficulty with existing resources (e.g. dialysis beds, exercise equipment)	20 (16.6)
Lack of interested/motivated patients due to ill health and lack of awareness	14 (11.6)
Prioritisation of other services/lack of vision	14 (11.6)
Lack of motivated medical staff	10 (8.3)
Lack of leadership and professional advice on how to organise a unit with rehab in mind	7 (5.8)
Lack of space	6 (5)
Lack of hard research evidence, lack of knowledge about available offered services within organisations, culture, obstruction by health and safety management	<5

Funding, lack of time and lack of appropriately knowl-

gest that nurses may also be more inclined to reject the

Barriers to exercise participation among dialysis patients

	Total participants, $N = 100$	Active participants, $N = 46$	Inactive participants, $N = 54$	P-value
Fatigue on dialysis days	67	65	69	0.72
Shortness of breath	48	43	52	0.82
'I don't want to'	42	33	50	0.07
Fatigue on non-dialysis days	40	35	44	0.33
Pain on dialysis days	38	37	38	0.84
Lack of time on dialysis days	31	22	38	0.06
Too many medical problems	26	15	35	0.02
Fear of getting hurt	24	24	24	0.98
Pain on non-dialysis days	23	19	26	0.45
No exercise partner	21	17	24	0.41
Lack of time because of too many medical appointments	20	17	22	0.54
Chest pain	17	19	15	0.52
Sadness	16	13	18	0.45
Feelings of helplessness	16	6	24	0.02
Lack of time on non-dialysis days	13	10	15	0.55
Inability to travel	13	10	11	0.55
Can't afford to exercise	11	10	11	0.97
Not wanting to be seen doing exercise	11	8	13	0.49
Feeling too old	9	4	13	0.13
No place to exercise	9	6	11	0.42
Ulcers on legs and feet	7	0	13	0.01
Lack of safe place for exercise	7	6	7	0.86
Family concern	5	2	7	0.23
Physician concern	2	2	2	0.29
Amputation	1	0	2	0.35

Barrier	Beta coefficient	P-value
Number of barriers endorsed	−2.6 (−4.17, −1.08)	0.001
Feeling helpless	−0.17 (−0.32, −0.01)	0.03
Lower extremity ulcers	−0.11 (−0.22, −0.005)	0.04
Having too many medical problems	−0.3 (−0.45, −0.09)	0.003
No time on hemodialysis days	−0.24 (−0.43, −0.05)	0.01
'Just don't want to exercise'	−0.23 (−0.44, −0.02)	0.03
Shortness of breath	−0.22 (−0.42, −0.02)	0.03
Fatigue on non-dialysis days	−0.17 (−0.4, 0.04)	0.1
Fatigue on dialysis days	−0.07 (−0.3, 0.1)	0.5

Delgado C, Johansen K. NDT 2012; 27: 1152-7

Barriers to Utilization of Renal Rehabilitation

- Fewer than 20% of all eligible patients participate in a RR
- Factors contributing to poor utilization:
  - lack of centralized method for referral
  - inadequate communication among treatment teams, patients, and RR facilities
  - unfamiliarity with RR among potential referring physicians
  - limited access, and perceived inconvenience for the patient

Delgado C, Johansen K. NDT 2012; 27: 1152-7

Other studies

CLINICAL KIDNEY JOURNAL

ckj

OXFORD

Clinical Kidney Journal, 2015, vol. 8, no. 6, 753–765

doi: 10.1093/ckj/sfv099
Advance Access Publication Date: 20 October 2015
CKJ Review

CKD Care

CKJ REVIEW

Effects of exercise in the whole spectrum of chronic kidney disease: a systematic review

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Correspondence to: Franklin C. Barcellos, E-mail: fcbarcellos.su@gmail.com

Abstract

Chronic kidney disease (CKD) is a public health problem. Although physical activity is essential for the prevention and treatment of most chronic diseases, exercise is rarely prescribed for CKD patients. The objective of the study was to search for and appraise evidence on the effectiveness of exercise interventions on health endpoints in CKD patients. A systematic review was performed of randomized clinical trials (RCTs) designed to compare exercise with usual care regarding effects on the health of CKD patients. MEDLINE, EMBASE, Cochrane Central, Clinical Trials registry, and proceedings of major nephrology conference databases were searched, using terms defined according to the PICO (Patient, Intervention, Comparison and Outcome) methodology. RCTs were independently evaluated by two reviewers. A total of 5489 studies were assessed for eligibility, of which 59 fulfilled inclusion criteria. Most of them included small samples, lasted from 8 to 24 weeks and applied aerobic exercises. Three studies included only kidney transplant patients, and nine included pre-dialysis patients. The remaining RCTs allocated hemodialysis patients. The outcome measures included quality of life, physical fitness, muscular strength, heart rate variability, inflammatory and nutritional markers and progression of CKD. Most of the trials had high risk of bias. The strongest evidence is for the effects of aerobic exercise on improving physical fitness, muscular strength and quality of life in dialysis patients. The benefits of exercise in dialysis patients are well established, supporting the prescription of physical activity in their regular treatment. RCTs including patients in earlier stages of CKD and after kidney transplantation are urgently required, as well as studies assessing long-term outcomes. The best exercise protocol for CKD patients also remains to be established.

Key words: chronic kidney disease, dialysis, exercise, physical activity

Introduction

Chronic kidney disease (CKD) is a current public health problem associated with progression to end-stage renal disease (ESRD), cardiovascular disease and increased mortality rates. The disease has a progressive course, and it is estimated that for every patient on renal replacement therapy (RRT) there are 20–25 patients with milder kidney damage [1].

The risk of cardiovascular events increases proportionally with the decline of glomerular filtration, reaching rates 10–20 times higher than in the general population among ESRD patients [1]. The mortality rate of CKD patients is 15–30 times higher than that of healthy individuals. The disease is also associated with greater health expenditures [2] and lower health-related quality of life (HRQOL) [3].

Barcellos CKJ 2015

Overview of talk

- **Introduction / Background**
- **Our studies:**
  - Regular aquatic exercise for chronic kidney disease patients and a ten-year follow-up study (*Pechter et al. Nephrol Dial Transplant, 2003; Int J Rehabil Res, 2003, Int J Rehabil Res, 2014)*
  - Impact of walking on health-related quality of life scores in patients with chronic kidney disease: A cross-sectional study in Estonia (*Pechter Ü, et al. Baltic Nepheology Conference 2016, IJKD 2019, Submitted)*

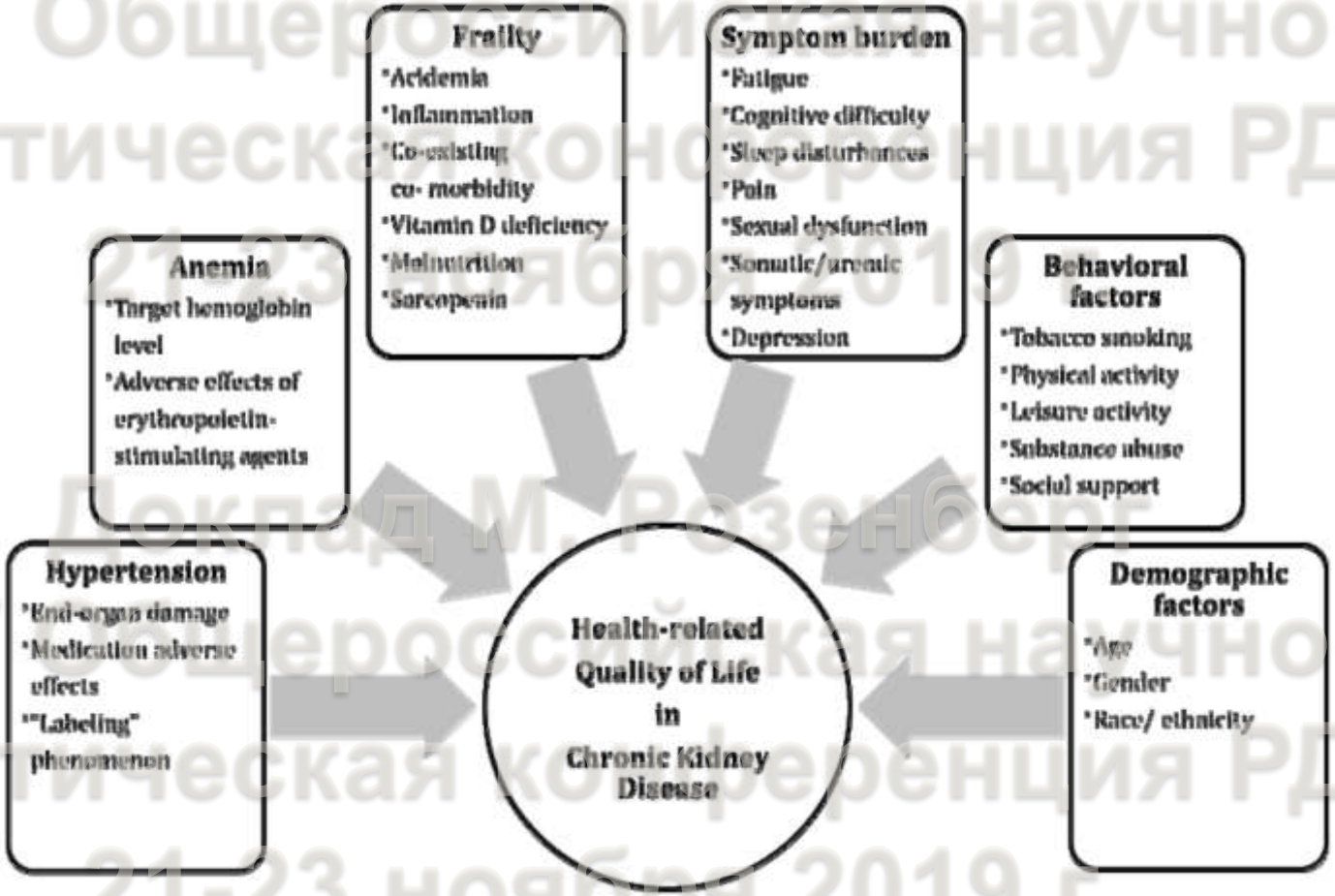
  Physical activity among nephrologists, residents and nurses - observational cross-sectional survey (*Posterpresentation, ERA-EDTA 54. congress 2017*)
- **Barriers to utilization of physical activity and renal rehabilitation**
- **Future directions**

Future directions

Appropriate use of physical activity and renal rehabilitation can lead to improved outcomes

Exercise training should be considered as an important therapeutic modality for the comprehensive management of CKD patients

Factors influencing HRQoL and health outcomes

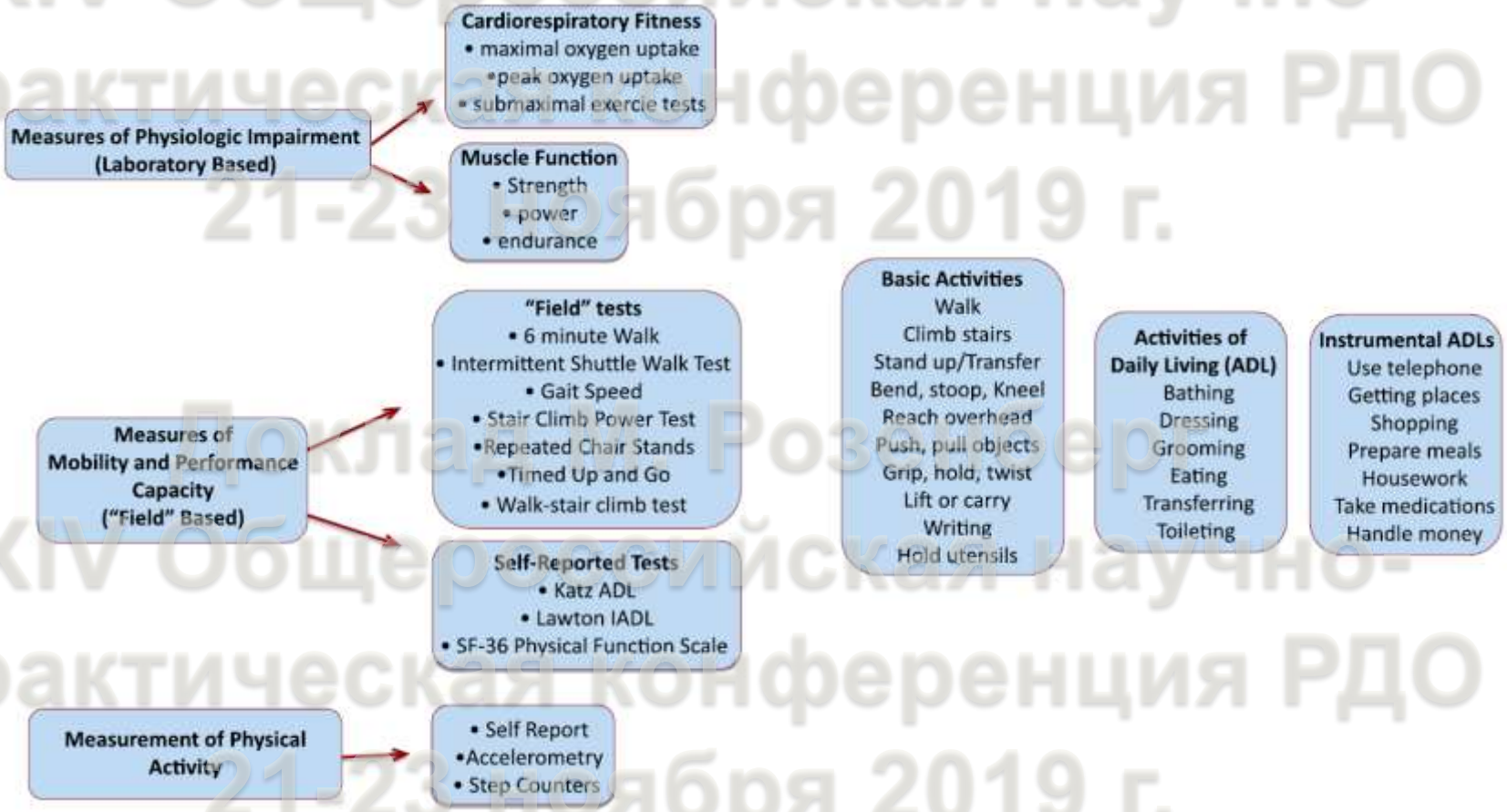


Data source: Soni R et al. CurrOpinNephrolHypertens. 2010; 19(2): 153–9

Determinants of physical function

Data source: Painter P. ACKD 2009;16:437-448

Measures of physical function and activity



Data source: Painter P and Marcus R. Clin J Am Soc Nephrol2013; 8: 861-72

New Paradigm for Renal Rehabilitation

Dialysis patients – ideal population to deploy new technologies to prevent complications, hospitalization and death

• Using devices/wearables to expand the length and scope of renal rehabilitation

• Many digital health devices/apps but need good outcome data

New Paradigm for Renal Rehabilitation

- Future directions in renal rehabilitation:

  - expanding cardiac rehabilitation to the home through digital and wearable technologies to reduce CV complications and readmission rates

  - the use of artificial intelligence

Thank you!