# Screening for malnutrition in CKD

Jessica Stevenson St George Hospital

# Background

- Malnutrition in ESKD is common
- In NSW RSC (2018 data)
- Conservative patients 35%
- Symptom support 52%

 Nutritional screening is a first-line process of identifying patients who may be at risk of becoming malnourished

 Nutritional assessment is a detailed investigation to identify and quantify specific nutritional problems enabling a diagnosis of malnutrition

# **Common malnutrition screening tools**

#### Malnutrition Screening Tool



#### Malnutrition Universal Screening Tool



#### Mini Nutritional Assessment - SF

-					
	Screening				
	A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing swallowing difficulties? 0 = severe decrease in food intake 1 = moderate decrease in food intake 2 = no decrease in food intake	) or			
	B Weight loss during the last 3 months 0 = weight loss greater than 3 kg (6.6 lbs) 1 = does not know 2 = weight loss between 1 and 3 kg (2.2 and 6.6 lbs) 3 = no weight loss				
	C Mobility 0 = bed or chair bound 1 = able to get out of bed / chair but does not go out 2 = goes out				
	D Has suffered psychological stress or acute disease in the past 3 months? 0 = yes 2 = no				
	E Neuropsychological problems 0 = severe dementia or depression 1 = mild dementia 2 = no psychological problems				
	F1 Body Mass Index (BMI) (weight in kg) / (height in m <sup>2</sup> ) 0 = BMI less than 19 1 = BMI 19 to less than 21 2 = BMI 21 to less than 23				
	3 = BMI 23 or greater				

# Sensitivity of screening methods and malnutrition in CKD

Malnutrition Universal Screening Tool

- limited sensitivity to detect malnutrition; 13% and 54%  $^{\rm 1,\,2}$ 

Malnutrition Screening Tool

- limited sensitivity to detect malnutrition; 49%<sup>2</sup>

<sup>1</sup> Kosters CM, Duvan A, Yucesan E, Zweers-van Essen H, van Hamersvelt H. Diagnostic accurary of PG-SGA and MUST in patients with chronic kidney diseases, a pilot. *Clinical Nutrition*, 2016;35(suppl 1):S91–2.
 <sup>2</sup> Lawson C, Campbell KL, Dimakopoulos I, Dockrell M. 2011. Assess the validity and reliability of the MUST and MST nutrition screening tools in renal inpatients. *Journal of Renal Nutrition*, 2011;22(5)



Applied nutritional investigation

Sensitive and practical screening instrument for malnutrition in patients with chronic kidney disease



C. Marleen Kosters M.Sc.<sup>a,\*</sup>, Manon G.A. van den Berg Ph.D.<sup>a</sup>, Henk W. van Hamersvelt M.D., Ph.D.<sup>b</sup>

#### Aim:

- to examine the diagnostic accuracy of the MUST and the PG-SGA SF for malnutrition
- to assess the contribution of the different screening items of the MUST and the cPG-SGA to the explained variance in nutritional status as determined by the cPG-SGA score.
- to examine whether the PG-SGA-SF score, in combination with one of the items of the clinician's part of the cPG-SGA, can be used as a valid and compact nutrition assessment tool in patients with CKD.

# Methods

- Cross-sectional observational study
- Inclusion criteria: patients treated for >3 mo with HD; CKD stage 5 NFD patients; patients on dialysis 1 to 4 weeks before living related kidney transplantation; renal inpatients (all stages of CKD)
- Patients completed the PG-SGA-SF independently, dietitians conducted cPG-SGA and MUST screen.
- PG-SGA-SF score  $\geq$ 6 indicates at risk of malnutrition
- MUST  $\geq$ 2 indicates at risk of malnutrition
- Complete PG-SGA  $\geq$ 9 indicates malnutrition

#### **MUST** nutrition risk rating



#### PG-SGA short form: nutrition risk rating

1. Weight (See Worksheet 1) In summary of my current and recent weight: I currently weigh aboutkg I am aboutkg Six month ago I weighed aboutkg Six months ago I weighed aboutkg During the past two weeks my weight has: □ decreased 0 □ not changed 0 □ increased 0 Box IBox I	2. Food Intake: As compared to my normal intake, I would rate my food intake during the past month as: <ul> <li>unchanged</li> <li>more than usual</li> <li>less than usual</li> <li>less than usual</li> <li>I am now taking:</li> <li>normal food but less than normal amount</li> <li>little solid food</li> <li>only liquids</li> <li>only liquids</li> <li>very little of anything</li> <li>only tube feedings or only nutrition by vein</li> <li>Box 2</li> </ul>
<ul> <li>3. Symptoms: I have had the following problems that have kept me from eating enough during the past two weeks (check all that apply): <ul> <li>no problems eating mean</li> <li>no appetite, just did not feel like eating mean</li> <li>nausea mean</li> <li>constipation mean</li> <li>constipation mean</li> <li>mouth sores mean</li> <li>mouth sores mean</li> <li>moth sores mean</li> <li>mouth sores mean</li> <li>moth mean</li> <li>moth mean</li> <li>moth mean</li> <li>moth mean</li> <li>moth sores mean</li> <li>moth mean</li> <li>moth</li></ul></li></ul>	<ul> <li>4. Activities and Function: Over the past month, I would generally rate my activity as: <ul> <li>normal with no limitations</li> <li>not my normal self, but able to be up and about with fairly normal activities</li> <li>not feeling up to most things, but in bed or chair less than half the day</li> <li>able to do little activity and spend most of the day in bed or chair</li> <li>pretty much bedridden, rarely out of bed</li> <li>Box 4</li> </ul> </li> </ul>
Box 3	Additive Score of the Boxes 1-4 A

#### **PG-SGA** nutrition assessment

Scored Patient-Generated Subjective Global Assessment (PG-SGA)	Patient ID Information
History (Boxes 1-4 are designed to be completed by the patient.)         1. Weight (See Worksheet 1)         In summary of my current and recent weight:         I currently weigh about kg         I am about cm tall         One month ago I weighed about kg         Six months ago I weighed about kg         During the past two weeks my weight has:         decreased m l not changed m l increased m         Box 1	<ul> <li>2. Food Intake: As compared to my normal intake, I would rate my food intake during the past month as: <ul> <li>unchanged (0)</li> <li>more than usual (0)</li> <li>less than usual (0)</li> <li>I am now taking: <ul> <li>normal food but less than normal amount (0)</li> <li>little solid food (0)</li> <li>only liquids (0)</li> <li>only nutritonal supplements (0)</li> <li>only tube feedings or only nutrition by vein (Box 2</li> </ul> </li> </ul></li></ul>
<ul> <li>3. Symptoms: I have had the following problems that have kept me from eating enough during the past two weeks (check all that apply):</li> <li>no problems eating means and means</li></ul>	<ul> <li>4. Activities and Function: Over the past month, I would generally rate my activity as: <ul> <li>normal with no limitations en</li> <li>not my normal self, but able to be up and about with fairly normal activities en</li> <li>not feeling up to most things, but in bed or chair less than half the day en</li> <li>able to do little activity and spend most of the day in bed or chair en</li> <li>pretty much bedridden, rarely out of bed en Box 4</li> </ul></li></ul>
** Examples: depression, money, or dental problems Box 3	Additive Score of the Boxes 1-4

Worksheet 1 - Scori To determine score, ase 1 m data only if there is no 1 mo weight change and add one past 2 weeks. Enter total po	score	Worksheet 2 - Scot Score is derived by adding that pertain to the patient. Category Cancer					is list					
Wt loss in I month Points Wt loss in 6 months						AIDS 1 Pulmonary or cardiac cachexia 1						
10% or greater         4         20% or greater           5-9.9%         3         10 -19.9%           3-4.9%         2         6 - 9.9%           2-2.9%         1         2 - 5.9%					f decubitus, open wound, or fistula 1 f trauma 1				1			
				Presence of traun					1			
						Age greater than 65 years			1			
0-1.9%	0		0 - 1.9%									
Score for Worksheet 1 Record in Box I									for Wo ecord i			-
Worksheet 3 - Scor Score for metabolic stress is of of > 102 degrees (3 points) is Stress	determined (	by a num mg of p	nber of variab	renically		e protein & calorie needs. Th vould have an additive score f moderate (2)				8.	cest wi	tio has
Fever	no feve			and <1	01	≥101 and <102			≥102			
Fever duration -	no feve		<72			72 hrs			> 72			
Steroids	no ster		low	dose		moderate dose			high	dose s		
				mg pre valents	dnisone (dav)	(≥10 and <30mg prednisone			(≥30	mg pre valents	dnis /dee	ene
			equi	varenti 2	- uniti	equivalents/day)			edu	valerits	or day	"
									for Wo ecord i			
Worksheet 4 - Physi	col Ever	minet	lon	_			_					_
deficit, 3+ = severe deficit, R Fat Stores:	fuscle defici	t impact icit in th	ts point score sese categorie	e more th s are not	an fat defic additive bi	fat, muscle, & fluid status. S it. Definition of categories: 0 state used to clinically assess Fluid Status:	= no def the deg	icit, 1+ ree of d	= mild d leficit (or	eficit, 2 presenc	+ = n æ of e	ioderati excess (
deficit, 3+ = severe deficit. R Fat Stores: orbital fat pads triceps skin fold fat overlying lower ribs	fuscle defici taking of defi	t impact icit in th 0 0	ts point score sese categorie 1+ 1+ 1+ 1+	2* 2* 2* 2*	an fai defic additive bu 3+ 3+ 3+ 3+	<li>it. Definition of categories 0 g are used to clinically assess Fluid Status: ankle edema sacral edema ascrites</li>	= no def the deg	icit, 1+ rec of d ) )	= mild d leficit (or 1+ 1+ 1+	eficit, 2 presenc 2+ 2+ 2+ 2+	+ = 11 x: of c	3+ 3+ 3+
deficit, 3+ = severe deficit. R Fat Stores: orbital fat pads triceps skin fold fat overlying lower ribs Global fat deficit rating	fuscle defici taking of defi	t impact icit in th 0 0	ts point score bese categorie 1+ 1+	e more th s are not 2+ 2+	an fat defic additive bi 3+ 3+	it. Definition of categories. 0 r are used to clinically assess Fluid Status: ankle edema sacral edema ascrites Global fluid status	= no def the deg ( ( ( rating (	icit, 1+ rec of d ) ) )	= mild d leficit (or 1+ 1+ 1+ 1+ 1+	24 24 24 24 24	+ = n ce of e	3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit, R Fat Stores: orbital fat pads triceps skin fold fat overlying lower ribs Global fat deficit rating Muscle Status:	fuscle defici lating of defi	t impact icit in th 0 0 0 0	ts point score bese categorie 1+ 1+ 1+ 1+ 1+	2* 2* 2+ 2+ 2+ 2+	an fat defic additive by 3+ 3+ 3+ 3+ 3+	it. Definition of categories 0 r are used to clinically assess Fluid Status: ankle edema sacral edema ascrites Global fluid status Point score for the phy	= no def the deg ( ( rating sical ex	icit, 1+ rec of d ) ) am is o	= mild d leficit (or 1+ 1+ 1+ 1+ 1+	24 24 24 24 24	+ = n ce of e	3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit. R Fat Stores: orbital fat pads triceps skin fold fat overlying lower ribs Global fat deficit rating	fusche defici Lating of defi	t impact icit in th 0 0	ts point score sese categorie 1+ 1+ 1+ 1+	2* 2* 2* 2*	an fai defic additive bu 3+ 3+ 3+ 3+ 3+ 3+	it. Definition of categories 0 r are used to clinically assess Fluid Status: ankle edema sacral edema ascites Global fluid status Point score for the phy subjective rating of tota	= no def the deg ( ( rating ( sical ex i body (	icit, 1+ rec of d ) ) ) am is o leficit.	= mild d leficit (or 1+ 1+ 1+ 1+ 1+	24 24 24 24 24 24 24 24 24 24 24 24 24 2	+ = n ce of e	3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit, R Fat Stores: orbital fat pads uriceps skin fold fat overlying lower ribs Global fat deficit rating Muscle Status: temples (temporalis muscle)	fusche defici Lating of defi	t impact icit in th 0 0 0 0	ts point score bese categorie 1+ 1+ 1+ 1+ 1+ 1+	2* 2* 2* 2* 2* 2+ 2+ 2+	an fat defic additive by 3+ 3+ 3+ 3+ 3+	it. Definition of categories 0 r are used to clinically assess Fluid Status: ankle edema ascrite Global fluid status Point score for the phy subjective rating of the No deficit	= no def the deg ( ( rating ( sical ex i body (	icit, 1+ ree of d ) ) ) ann is d leficit. score =	= mild d leficit (or 1+ 1+ 1+ 1+ 1+ 0 point	24 24 24 24 24 24 24 24 24 24 24 24 24 2	+ = n ce of e	3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit, R Fat Stores: orbital fat pads uriceps skin fold fat overlying lower ribs Global fat difficit rating Muscle Status: temples (temperalis muscle) elavieles (peccentis & delus shoulders (deltoids) intercoscous muscles	fuscle defici taking of defi t t t t t t t t t t t t t	t impact icit in th 0 0 0 0 0 0 0 0 0 0	ts peint score sese categorie 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+	2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+	an fat defic additive bi 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+	it. Definition of categories 0 r are used to clinically assess Fluid Status: ankle edema sacral edema ascites Global fluid status Point score for the phy subjective rating of tota	= no def the deg ( ( rating ( sical ex i body (	icit, 1+ ree of d ) ) ) ann is o lefticit. score = score =	= mild d leficit (or 1+ 1+ 1+ 1+ 1+	24 24 24 24 24 24 24 24 24 24 24 24 24 2	+ = n ce of e	3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit, R Fat Stores: uriceps skin fold fat overlying lower ribs Global fat deficit rating Muscle Status: temples (temporalis muscle) elavieles (pectoralis & delus shoulders (deltoids) interosseous muscles Scapult (datinims dorni, traps	fuscle defici taking of defi t t t t t t t t t t t t t	t impact icit in th 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ts peint score pese categorie 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+	2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2	ian fat defic additive bi 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+	it, Definition of categories 0 r are used to clinically assess Fluid Status: ankle edema sacral edema acrites Global fluid status Point score for the phy subjective rating of tota Nisk deficit Misk deficit	= no def i the deg ( ( rating ( sical ex i body (	icit, 1+ ree of d ) ) ) ann is d leficit, score = score =	= mild d leficit (or 1+ 1+ 1+ 1+ 0 point 1 point	24 24 24 24 24 24 24 24 24 24 24 24 24 2	+ = n ce of e	3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit, R Fac Stores: orbital fat pads priceps skin fold fat overlying lower ribu Global fat deficit rating Muscle Status: temples (tomporalis muscle) elavieles (percoralis & delue clavieles (bettorids) intercosicous muscles scarpola (latinisme dorni, trap thigh (quadriceps)	fuscle defici taking of defi t t t t t t t t t t t t t	t impact icit in th 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ts point score hese categorie 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+	2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2	an fat defic additive bu 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+	it. Definition of categories 0 r are used to clinically assess Fluid Status: ankle edema sacral edema ascrites Global fluid status Point score for the phy subjective rating of tota No deficit Müd deficit Modernate dei	= no def s the deg ( ( rating ( sical ex. 1 body ( 1 ficit	icit, 1+ rec of d ) ) ) am is d leficit, score = score = score =	= mild d leficit (or 1+ 1+ 1+ 1+ 1+ 2+ 0 point 2 point 3 point	24 24 24 24 24 24 24 24 24 24 24 24 24 2	+ = m e of e e ove	3+ 3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit, R Fat Stores: uriceps skin fold fat overlying lower ribs Global fat deficit rating Muscle Status: temples (temporalis muscle) elavieles (pectoralis & delus shoulders (deltoids) interosseous muscles Scapult (datinims dorni, traps	fuscle defici ating of defi ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	t impact icit in th 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ts peint score pese categorie 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+	2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2	ian fat defic additive bi 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+	it. Definition of categories 0 r are used to clinically assess Fluid Status: ankle edema sacral edema ascrites Global fluid status Point score for the phy subjective rating of tota No deficit Müd deficit Modernate dei	= no def s the deg ( ( rating ( sical ex. 1 body ( 1 ficit	icit, 1+ rec of d ) ) am is d leficit, score = score = score =	= mild d leficit (or 1+ 1+ 1+ 1+ 2etermine 0 point 1 point 2 point 3 point	eficit, 2 presence 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+	+ = m e of e e ove	3+ 3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit, R Fat Stores: orbital fat pads uriceps skin fold fat overlying lower ribs Global fat deficit rating Muscle Status: temples (temporalis muscle) elavidets (detoids) intercoscosa muscles scapula (dataima dorsi, trap thigh (quadriceps) calf (gastromenius)	fuscle defici lating of def l l lids) ezaus deficido tilag	t impact icit in th 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	15 point score 1656 categorie 14 14 14 14 14 14 14 14 14 14	2* 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+	an far defic additive by 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+	it. Definition of categories 0 s are used to clinically assess Flaid Status: ankle edema sacral edema ascrites Global fluid status Point score for the phy subjective rating of tota No deficit Möld deficit Mödeficit	= no def s the degr ( crating 6 sical ex. d body e fical fical sical ex. fical sical ex. fical sical ex.	icit, 1+ rec of d ) ) am is d leficit, score = score = Score 1 Re Stag	= mild d leficit (or 1+ 1+ 1+ 1+ 1+ 2 point 2 point 3 point for Wor cord in	24 27 24 24 24 24 24 24 24 24 24 24 24 24 24	+ = m e of e e ove	3+ 3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit, R Fat Stores: orbital fat pads irriceps skin fold fat overbying lower ribs Global fat deficit rating Muscle Status: reemples (comporalis muscle) clavicles (peeconik & delus shoulders (deltoids) intercoscoros muscles scapula (atimima deri, trap high (quadriceps) calt (gastriceps) calt (gastricensis) Global muscle status ra Worksheet 5 - PG- Category	fusele defici tasing of defi t hids) ezars, debods ting SGA GI <u>Stage</u> Well-nour	t impact icit in th 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	15 point score 1656 categorie 14 14 14 14 14 14 14 14 14 14	2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2	an far defic additive by 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+	it. Definition of categories 0 s are used to clinically assess Flaid Status: ankle edema ascral edema ascral edema ascras Global fluid status Point score for the phy subjective nating of tota No deficit Mild deficit Moderate del Severe defici e E maîncuristed d maînatrition	= no def s the degr ( crating s sical ex. 1 body d 5 ficit s Seven	icit, 1+ ree of d ) ) ) am is of efficit. score = score = Score 1 Re Score 1 Re	= mild d leficit (or 14 14 14 14 14 14 14 14 14 14 16 1 point 2 point 3 point 3 point 6 cord in cord in	2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2	+ = m e of e e ove	3+ 3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit, R Fat Stores: orbital fat pads priceps skin fold fat overlying lower ribs Global fat deficit rating Muscle Status: temples (temporalis emuscle) clavicles (percondit & defin shoulders (detoids) intercosecous muscles scapula (utiminas dorai, trap thigh (quadriceps) calf (gastriceps) calf (gastriceps) calf (gastriceps) calf (gastriceps)	fusele defici asing of def i initial initia initi initia initi initia initia initia initia i i i i i i i i i i	t impact icit in th 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ts point score nese categorie 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+	2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2	an far defic additive by 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+	it. Definition of categories 0 s are used to clinically assess Flaid Status: ankle edema sacral edema ascrites Global fluid status Point score for the phy subjective rating of tota No deficit Mild deficit Moderate del Severe defici	= no def s the deg ( crating s sical ex l body s ficit Seven > 5%	icit, 1+ rec of d ) ) ) ann is 6 leficit. score = score = score = Score 1 Re Stag we have a start score s score s	= mild d leficit (or 1+ 1+ 1+ 1+ 2 point 2 point 3 point for Wor cord in	24 24 24 24 24 24 24 24 24 24 24 24 24 2	+ = n e of c e ovo	3+ 3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit, R Fac Stores: orbital fat pads niceps skin fold fat overlying lower ribe Global fat deficit rating Muscle Status: temples (tomporalis muscle) elavieles (perovalis & delm shoulders (deficits) interosseosa muscles scapul (quadriceps) calf (gastrocentus) Global muscle status ra Worksheet 5 - PG- Cniegory Weight	fusele defici tasing of defi- tion of the second transformation of the second second second second second second Stage. Well-nour No wet loss Recent noo	it impact facilities in the o o o o o o o o o o o o o o o o o o o	ts point score nese categorie 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+	2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2	an fai defic additive bu 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+	it. Definition of categories 0 s are used to clinically assess Flaid Status: ankle edema ascrites Global fluid status Point score for the phy subjective rating of tota No deficit Möld deficit Mödeficit Mödeficit Severe defici i e.B maßneuristeat d mafmarition ss within 1 month	= no def s the deg ( ( crasting 4 ssical ex. 1 body 4 5 sical ex. 1 body 4 sical ex. 1 body 5 sical ex. 1 body 4 sical ex. 1 body 5 sical ex. 1 body 5 sicody 5 sical ex.	icit, 1+ ree of d ) ) ) am is d lefficit. score = secore = Score 1 Re Stag score = Stag score = Stag	= mild d lefficit (or 14 14 14 14 14 14 16 1 point 2 point 3 point 6 or Wor cord in <u>e. C</u> ditourishe s in 1 m	24+ 24- 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+	+ = n e of e e ove D OE	3+ 3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit, R Fac Stores: orbital fat pads interps skin fold fat overlying lower ribu Global fat deficit rating Muscle Status: temples (tomporalis muscle) elavieles (percoralis & deline shoulders (deficióls) intercesseos muscles scapoli (latinimus doni, traje thigh (quadriceps) calf (gastrocnemius) Global muscle status ra Worksheet 5 - PG- Category Weight	fusele defici tasing of defi- tions of defi- tions of defi- ting scalars, definide ting SGA GI Stage, Well-nour No we loss Recent and No deficit	it impact icit in th 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ts point score nese categorie 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+	2* 2* 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+	an fai defie additive bu 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+	it. Definition of categories 0 s are used to clinically assess Flaid Status: ankle edema sacral edema ascrites Global fluid status Point score for the phy subjective rating of tota No deficit Möd deficit Möd deficit Möd deficit Mödeficit Möderste del Severe defici 6 e.B malineurishest d malmatrition ss within 1 month in 6 months) OR Ilization er wt gain inued wt loss) recise in intike	= no def ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( (	icit, 1+ rec of d ) ) ) ) ) ) ) ) ) ) ) ) ) ) ) ) ) ) )	= mild d leficit (or 1+ 1+ 1+ 1+ 2 point 2 point 3 point 3 point 6 r Wor cord in 6 r Wor cord in 6 m 6 m 11 a minute 4 m 1 m 1 m 1 m	24 24 24 24 24 24 24 24 24 24 24 24 24 2	+ = n e of e e ove D OE	3+ 3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit, R Fac Stores: orbital fat pads niceps skin fold fat overlying lower ribe Global fat deficit rating Muscle Status: temples (tomporalis muscle) elavieles (perovalis & delm shoulders (deficits) interosseosa muscles scapul (quadriceps) calf (gastrocentus) Global muscle status ra Worksheet 5 - PG- Cniegory Weight	fusele defici taing of defi- taing of defi- nids) erzus, debiolo thag SGA GI Stage. Wull-nour No wt loss Recent and Significant No deficit Significant None OR	it impact icit in th 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ts point score nexe categorie 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+	2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2	an far defic additive bu 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+	<ul> <li>it. Definition of categories: 0         <ul> <li>are: used to clinically assess</li> <li>Flaid Status:</li></ul></li></ul>	= no def i the degr ( ( ( ( no size examples of the size of the	icit, 1+ rec of d ) ) ) ) am is d lefticit. score = score = score = score = Re Stag wt bos w > 109 Mt stah L.E., con	= mild d leficit (or 1+ 1+ 1+ 1+ 1+ determine 0 point 2 point 2 point 2 point 3 point 3 point 6 or Wor cord in 6 or Wor cord in 8 in 1 m itization dinued w	24 gresence 24 24 24 24 24 24 24 24 24 24 24 24 24 2	+ = n e of e of e over a e over a e over over over over over over over ove	3+ 3+ 3+ 3+ 3+ 3+
deficit, 3+ = severe deficit, R Fat Stores: orbital fat pads miceps skin fold fat overlying lower ribs Global fat deficit rating Muscle Status: temples (temporalis muscle) clavicles (pectendit & delin shoulders (detoids) interosseous muscles scapela (detoids) interosseous muscles scapela (detoids) caff (gastrocnemius) Global muscle status ra Worksheet 5 - PG- Category Weight Nutrient Intake Nutrition Impact	fusele defici tasing of defi- tasing of defi- tion index) erzaus debuide ting SGA GI Stage. Well-nour No wt loss Recent noo No deficit Significant None OR Significant allowing & No deficit	it impact licit in th 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ts point score nexe categorie 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+ 1+	2* 2* 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+ 2+	an far defic additive by 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+ 3+	<ul> <li>ii. Definition of categories. 0         <ul> <li>are used to clinically assess</li> <li>Flaid Status:</li></ul></li></ul>	= no def i the degr ( ( ( ( ) ( ) ( ) sical exc sical exc sical exc ficit ( ) Sever ( ) Sever Prese symp Sever	icit, 14 rec of d ) ) ann is d lefticit. score = score = Score 1 Re Stag wt bos r > 109 wt bos r > 109 wt bos r > 109 icities icities score = score = sco	= mild d leficit (or 1+ 1+ 1+ 1+ 1+ 2 point 2 point 2 point 2 point 3 point 3 point 3 point 3 point 2 point 3 point 1 point 2 point 1 point 2 point 1 point 2 point 1 point 1 point 2 point 1 point 1 point 2 point 1 point 2 point 1 point 2 point 1 point 2 point 1 point 1 point 2 point 2 point 1 point 2	24 24 24 24 24 24 24 24 24 24 24 24 24 2	+ = n = of e = ove 4 = D OE ain A) R	3+ 3+ 3+ 3+ 3+ 3+

Global PG-SGA rating (A, B, or C) =

## Results

- N=123 (68 outpatients, 55 inpatients)
- Modality
- Dialysis n=64 (88% outpatients, 12% inpatients)
- Non-dialysis n=59 (20% outpatients, 80% inpatients)
- Nutritional status (PG-SGA)
- 56% well nourished (average age 58 years)
- 44% malnourished (average age 66 years)

## Results

#### Table 2

Accuracy of the MUST score  $\geq 2$  and the PG-SGA-SF score  $\geq 6$  to detect malnutrition as defined by a complete PG-SGA  $\geq 9$ 

	$MUST \ge 2$	$PG\text{-}SGA\text{-}SF \geq 6$
Sensitivity (95% CI)	24(13-38)	0.78 (0.64-0.88)
Specificity (95% CI)	94 (86-98)	0.94 (0.86-0.98)
Positive predictice value (95% CI)	76 (50-93)	0.91 (0.79-0.98)
Negative predictive value (95% CI)	61 (51-71)	0.84 (0.74-0.92)

MUST, Malnutrition Universal Screening Tool; PG-SGA-SF, Patient-Generated Subjective Global Assessment Short Form.

#### **Overall accuracy (AUC)**

- MUST 0.63 (0.54-0.72)
- PG-SGA-SF 0.87 (0.8-0.92)

### Results

#### Table 3

Individual and cumulative contribution of the items of the screening tools MUST and PG-SGA SF to the explained variance in nutritional status

	R <sup>2</sup> per item	Cumulative* R <sup>2</sup>	ROC-AUC (95% CI)
MUST			0.63 (0.54-0.72)
Weight loss	0.109	0.109	
No food intake $\geq 5 d$	0.045	0.035	
BMI	0.013	0.002	
Total R <sup>2</sup>		0.146	
PG-SGA-SF			0.87 (0.80-0.92)
Nutritional impact	0.571	0.571	
symptoms			
Food intake	0.289	0.071	
Daily functioning	0.274	0.034	
Weight	0.248	0.066	
Total R <sup>2</sup>		0.742	

AUC, area under the curve; BMI, body mass index; MUST, Malnutrition Universal Screening Tool; PG-SGA-SF, Patient-Generated Subjective Global Assessment Short Form; ROC, receiver operating characteristic.

\*Increase in explained variance after addition of an individual screenings item.

## Discussion

- Sensitivity of MUST unacceptably low (similar to earlier studies)
- due to relying on weight and BMI



In CKD, as muscle stores decrease there is a simultaneous increase in fat and fluid mass

Therefore, weight (alone) is not a good indicator of changes in nutritional status

## Discussion

- Sensitivity of MUST unacceptably low (similar to earlier studies)
- due to relying on weight and BMI both poor indicators of malnutrition in CKD
- Patients completing PG-SGA-SF may overestimate nutrition impact symptoms, improved sensitivity if dietitians completed this form with patients in earlier studies
- Nutrition impact symptoms explained 57% of variance in nutritional status
- Previous study<sup>3</sup> shown nutrition impact symptoms alone had 89% sensitivity to detect malnutrition and sig assoc with admission LOS

<sup>3</sup> MacLaughlin HL, Twomey J, Saunt R et al. 2018. The nutrition impact symptom score detects malnutrition risk in patients admitted to nephrology ward. Journal of Human Nutrition and Dietetics, vol 31

### Limitations

- Use of PG-SGA rather than SGA which is a more common nutritional assessment tool
- Incorporation bias of PG-SGA-SF domains into the PG-SGA

# Strengths

- Clinical relevance and application
- inpatient screening tools most often MST / MUST which fail to identify malnutrition in most CKD patients
- simple tool, completed by either patients or clinicians

# Conclusion

- PG-SGA-SF is an easy to use, with high overall accuracy (87%) to identify malnourished CKD patients
- Nutrition impact symptoms have the largest impact on identification of malnutrition in CKD patients

#### Application in RSC

- Malnutrition screening in CKD should incorporate exploration of symptoms that impact on dietary intake
- PG-SGA-SF may be a useful screening tool to assist in referral / prioritisation
- When not possible to conduct SGA (i.e. telehealth) PG-SGA-SF may be a useful tool to indicate nutritional risk