ARTICLE

Development of the South African Renal Exchange Lists

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Objective. The objective of this developmental study was the development of renal exchange lists for the South African population with renal failure.

Subjects and design. A questionnaire was circulated to South African renal dietitians to establish the format and composition of the proposed exchange lists. Foodfinder 3 was used for assessment of nutrient composition of foods, and the NRIND Food Quantities Manual was used for assessment of portion sizes. Results from the Food Consumption Study were used to identify food items frequently consumed by the South African population, and dietitians with knowledge of the eating habits of Moslem, Indian, white, black and coloured groups were consulted regarding the inclusion of cultural foods. Portion sizes were determined by protein content of foods. The preliminary exchange lists were circulated for comment and tested for a period of 1 year.

Results. Many new food items were added during revision of the exchange lists. Portion sizes were adapted to be more realistic, and in some cases additional sub-groups were added. Foodfinder 3 and renal exchange list values for all food items included in the exchange lists were then compared, and this showed highly significant correlations for all nutrients concerned. There was no significant difference between mean nutrient values for the two methods, with the exception of protein, the content of which was consistently and significantly underestimated by a mean of 0.1 g per food item. This underestimation is not considered to be of clinical importance.

Conclusion. In this study renal exchange lists were developed for use in South African persons with renal failure. Despite the small but significant underestimation of protein content, the lists appear to be of sufficient precision for use in clinical practice.

The exchange list system is a practical tool used by dietitians to convert a diet prescription into a meal plan. The system sorts foods into groups with similar nutrient content. Foods may not always be in the group one would expect, because they are grouped according to their nutrient content rather than by type of food. Cheese and eggs, for example, may fall into the meat rather than the dairy group and potatoes may fall into the starch rather than the vegetable group. Foods within a given list are interchangeable with other foods in the same list. The exchange system does, however, not guarantee adequate intake of all nutrients, especially of vitamins and minerals, and the dietitian must make sure that the diet contains adequate servings from each exchange list.

The first exchange lists used in the planning of diets were those developed by the American Dietetic Association, the American Diabetes Association and the US Public Health Service in 1950.[1] These lists were used for meal planning for persons with diabetes and those on weight-loss diets. There is little published information on the methodological basis of exchange lists, the justification for inclusion or exclusion of food items, and its clinical effectiveness. Indeed, some studies reported that the use of exchange lists in the planning of therapeutic diets has led to an over- or underestimation of nutrient intake.[2] Carbohydrate exceeded the prescribed intake by 16%, protein by 13% and fat by 32%. Micronutrient intake, on the other hand, was low in the case of calcium, iron and vitamins. Other studies found large variations for energy and macronutrient values within exchange lists.[3] In renal patients such imprecision may have adverse implications for weight maintenance and the realisation of safe biochemical targets. The Modification of Diet in Renal Disease (MDRD) feasibility study reported that imprecision of the exchange methodology used in the dietary instruction of research subjects may have been a factor in the difficulty participants had in achieving dietary control within ±10% of the target protein goal.[4]

Until recently, a variety of renal exchange lists has been in use for the planning of renal diets in South Africa.[5] Most of these exchange lists were variations of those used in the USA or elsewhere, and did not include foods that are traditionally part of the diet of South Africans. In many cases dietitians did not know the origin of the lists they were using. The need to develop renal exchange lists for use in the South African population was first expressed by the Association for Dietetics in South Africa (ADSA), who delegated this task to a sub-committee. The objective of this study was therefore the development of renal exchange lists for use in South African persons with renal disease.

Methods

Target population

Dietitians involved with the planning of diets for South African patients with renal failure were targeted.

Study design

This was a developmental study.

Procedures

The phases in the development of the exchange lists are shown in the conceptual framework (Fig. 1). In Phase 1 a questionnaire was circulated to all dietitians working in renal units in South Africa, and to all the different ADSA branches, in order to establish a conceptual format of the new renal exchange lists. The response rate could not be determined because many dietitians chose to give their feedback within a group effort. This was followed by the development of the first draft of the renal exchange lists.

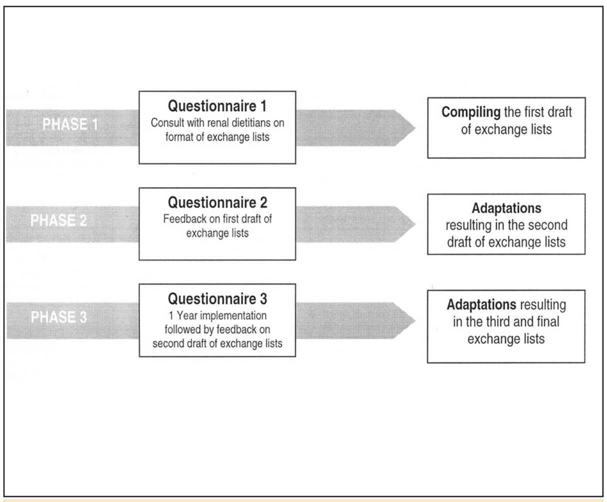

Fig. 1. Conceptual framework of the methodology followed in the development of the South African renal exchange lists.

In the second phase of the study, the first draft of the exchange lists was circulated to the same target group for comments. The accompanying questionnaire included questions on: (*i*) food items that should be added or excluded from the exchange lists; (*ii*) agreement with the foods that must be restricted; (*iii*) satisfaction with the methods used to determine portion sizes; (*v*) satisfaction with the method used to determine the average nutrient content per portion; and (*vi*) general comments. Adaptations were made and in the third phase of the study the second draft of the exchange lists were circulated, again to the same target group. During this phase dietitians were asked to test the exchange lists for a period of 1 year. This was followed by the completion of the third questionnaire in which they could make further recommendations. This questionnaire included questions on: (*i*) food items that should be added to or excluded from the exchange lists; (*ii*) food items that should be moved to another exchange list, together with a motivation in each case; (*iii*) agreement with the foods that should be restricted; (*iv*) food items where the portion size is not practical, together with a motivation and suggestions for change; and (*v*) a description of any difficulties experienced with the implementation of the lists, together with suggestions on how to improve the lists.

During the development of the exchange lists the results from the Food Consumption Study[6] were used to identify food items frequently consumed by the South African population, and dietitians with knowledge of the eating habits of Moslem, Indian, black, coloured and white groups were consulted regarding the inclusion of cultural foods. We followed the approach that as many foods as possible should be included in the lists, thereby avoiding an overly restrictive diet. Care had to be taken, however, not to make the lists too long and cumbersome. Foodfinder 3[7] was used for the assessment of nutrient composition of foods, and the *NRIND Food Quantities Manual*[8] was used for assessment of portion sizes. In deciding on the protein content of the different exchange lists that would be used for further calculations, we used the example of the National Renal Diet Food Choice List of the Renal Nutrition Council (USA).[9] In order to keep portion sizes as simple and realistic as possible, we sometimes had to deviate from the protein content of the specific list. Metric as well as household measures were included. Foods that should be restricted were indicated at the end of a particular list, together with the rationale. In the determination of average nutrient content per portion for the relevant nutrients, we first calculated the arrhythmic mean for all food items within a list. Owing to a very wide variation for some nutrients, it was decided to ignore food items that deviated more than 50% of the SD for a specific nutrient, and to highlight them as outliers. The average nutrient content of a portion of food was therefore equal to the average of the particular exchange list, excluding the outliers, and then rounded off.

Final adaptations were made according to the feedback received, and for each of the exchange lists or sub-groups, the mean values, standard deviations, and ranges were calculated for the nutrients concerned. Outliers were excluded from these calculations, and they are highlighted in the lists as exceptions. Pearson's correlation coefficient was used to test for a significance of correlation between Foodfinder 3 and renal exchange list values for all food items included in the exchange lists ($N = 381$), and the t-test for dependent samples was used to test for significance of differences between the two methods. Statistical significance was set at $p < 0.05$.

Results

Results on the first questionnaire showed that the majority of dietitians felt that the renal and diabetic exchange lists should not be combined for practical reasons, and that the following exchange lists should be included: meat (both a high-phosphate and a low-phosphate list), milk, starch (a high-potassium and a low-potassium list), vegetables (a high-potassium and a low-potassium list), fruit (a high-potassium and a low-potassium list), beverages, sugar and fat.

It was further agreed that the exchange lists would be analysed for energy, protein, fat, carbohydrate, phosphorus, potassium and sodium and that protein content would serve as the basis for determination of portion size. For each list the average nutrient composition would be determined, and there would be a list of foods to be restricted.

The most important changes made during the third phase of the study are shown in Table I. Although many new food items were added to the lists, not all requests could be accommodated owing to the lack of information on nutrient composition for some foods. Portion sizes were adapted to make them more realistic and, owing to the large number of outliers which made implementation difficult, it was decided to redefine the outliers as those foods for which nutrient content deviated more than two standard deviations (SD) from the group mean.

In some cases food sub-groups were added to distinguish between food items with large deviations from the average nutrient composition. These changes resulted in 8 major exchange lists, of which some were further divided into relatively homogeneous sub-groups. The mean values, standard deviations, and ranges for the relevant nutrients in the exchange lists are shown in Table II. It is clear that the actual mean values of the different exchange lists closely match the rounded off mean values of the respective lists. The SD is acceptable in the majority of cases. The exceptions are the beverages (for protein, fat, phosphorus and potassium), sugar (for fat and potassium), meat (for carbohydrate), fat (for phosphorus and sodium) and vegetable (for sodium) lists, in which cases the SD exceeds the average values. The ranges are fairly large for most nutrients, in some cases exceeding the average values by more than 100%, despite the use of outliers and the introduction of sub-groups. The exceptions in this case are protein, phosphorus and potassium content, which were acceptable in most cases.

Comparison between Foodfinder 3 and renal exchange list values for all food items included in the exchange lists showed highly significant correlations for all nutrients concerned (Table III). There was also no significant difference between mean nutrient values for the two methods, with the exception of protein which, surprisingly, showed a significant underestimation of protein content by a mean of 0.1 g per food item. Further investigation of the exchange lists showed that possible causes for this difference are the meat list, where a significant underestimation of 0.3 g protein per portion was identified, as well as the starch list (significant underestimation by 0.2 g) and the sugar and fat lists (significant underestimation by 0.1 g each). The underestimation of 0.1 g protein per portion (all food items), although statistically significant, was not considered of sufficient clinical importance to require further adaptations to the exchange lists.

Discussion

The development of the renal exchange lists in this study was much needed and will lead to greater uniformity among renal dietitians in the planning of diets for persons with renal failure. The use of a South African data base for food composition and the inclusion of culture-specific foods is also an advantage, as previous lists were based mostly on food composition data bases and foods of other countries. The addition of fat and carbohydrate content of foods is another advantage, as it was previously not possible to calculate the fat and carbohydrate content of a meal plan. Fat intake is especially important against the background of the high prevalence of cardiovascular morbidity and mortality of renal patients,[10] and it is recommended that fat intake should not exceed 35% in patients with chronic renal failure.[11] Carbohydrate content, on the other hand, is important for patients suffering from diabetic nephropathy. The new exchange lists are easier to use for the planning of diets for patients with diabetic nephropathy, not only because they provide data on carbohydrate content, but also because the inclusion of sub-groups often separates food items commonly restricted in diabetics.

The large SDs and ranges for some nutrients found in this study are in agreement with the report on the 1995 Exchange Lists for Meal Planning of diabetic diets.[3] Along similar lines, the MDRD Study reported that the renal exchange system used in their feasibility study

Table I. Summary of main comments and changes made to the first draft of the exchange lists

Comments	Action
Food items that must be added	
• Addition of several foods • Addition of enteral products	• A bigger variety of food items were included. • Not all food items requested were included because food composition was not always available. • Enteral products were not included in the current lists because they would not fit into any of the existing lists. Depending on the need, it may be considered again with the next revision.
Food items that must be excluded from the lists/restricted	
• Peanuts should be restricted • Outliers should all be restricted • All cheeses must be restricted	• Peanuts were included in the legumes list because it is a good and relatively cheap source of protein, it provides variety in the diet, and it can form part of a P-restricted diet. Salted peanuts must, however, be restricted. • It was decided to include the outliers in the lists, because it allows more variety for patients who do not need restriction of the specific nutrients involved, and because it often is a good energy source. • Cheese is a good alternative for meat, provides variety in the diet, it is regularly consumed by patients, and it can form part of a P- and Na-restricted diet.
Food items that must be moved to another list	
• Add a list for legumes	• A legume list has been added as an alternative to meat. • Group outliers together where possible • Outliers were grouped together in a meaningful way where possible.
More sub-groups for fruit and vegetables	
• Requests for additional list with moderate potassium content	• A moderate potassium list was added for both the fruit and vegetables.
Portion size must be changed	
• Several requests for more realistic/standard portion sizes	• Portion sizes were adapted where possible. This resulted in some food items being moved from one list to another.
Problems experienced with implementation	
• High average energy and fat content of the starch lists caused total energy and fat content meal plans to be too high, incorrectly so. • Restricted food items must also be analysed • The lists must correspond to the diabetic exchange lists • Use the same household measure throughout (e.g. cups) • Use carbohydrate as the basis in determining portion sizes • Ignore protein content of fruit and vegetables	• Lists were adapted by the creation of sub-divisions for drink the milk, starch and drink lists. This resulted in exchange lists with a more accurate energy content and less variation. • It was decided not to analyse the restricted food items, because it would make the lists too long with too much technical detail. • It was decided in the first phase of the study already that it will not be practical to have one set of exchange lists for diabetic and renal patients. The reason for this decision is the difference between the two groups of patients regarding key nutrients involved, and foods that may be allowed or that must be restricted. To the best of our knowledge such a combination does not exist anywhere else in the world. However, it is recommended that an additional set of renal exchange lists must be developed that can be used for patients with diabetic nephropathy. • The same household measure (e.g. $^1/_2$ cup) was used where relevant, but it was impractical to do so with all food items. • It was decided in the first phase of the study to use protein as the basis of portion sizes. To use carbohydrate as the basis would be inappropriate for renal exchange lists. • It was decided not to ignore the protein content of fruit and vegetables, as it would lead to an underestimation of the actual protein content of diets. This is in line with international renal exchange lists.
Inaccuracies encountered	
• Fat content of butter • Foods were placed in the wrong lists	• The fat content of butter and margarine was reanalysed. • Foods that were placed in the wrong lists were corrected.

Table II. Mean values, standard deviation (SD) and range for nutrients in the different exchange lists

	Energy (kJ)			Protein (g)			Fat (g)			CHO (g)			P (mg)			Na (mg)			K (mg)		
Exchange list	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**
Meat – low phosphate (350 kJ, 7 g protein, 5 g fat, 0 g CHO, 65 mg P, 55 / 430 mg Na, 90 mg K)*																					
Low Na	352	183	119 - 834	7	1	4 - 10	4	3	0.2 - 13	1	3	0 - 6.5	66	15	33 - 95	53	53	0 - 189	91	35	20 - 183
High Na	352	183	119 - 834	7	1	4 - 10	4	3	0.2 - 13	1	3	0 - 6.5	66	15	33 - 95	433	134	229 - 672	91	35	20 - 183
Meat – high phosphate (350 kJ, 7 g protein, 5 g fat, 0 g CHO, 120 mg P, 55 / 430 mg Na, 90 mg K)*																					
Low Na	352	183	119 - 834	7	1	4 - 10	4	3	0.2 - 13	1	3	0 - 6.5	121	22	94 - 170	53	53	0 - 189	91	35	20 - 183
High Na	352	183	119 - 834	7	1	4 - 10	4	3	0.2 - 13	1	3	0 - 6.5	121	22	94 - 170	433	134	229 - 672	91	35	20 - 183
Meat – legumes (350 kJ, 7 g protein, 5 g fat, 15 g CHO, 120 mg P, 55 / 430 mg Na, 245 mg K)*																					
Low Na	352	183	119 - 834	7	1	4 - 10	4	3	0.2 - 13	15	11	0.7 - 33	121	22	94 - 170	53	53	0 - 189	243	82	73 - 346
High Na	352	183	119 - 834	7	1	4 - 10	4	3	0.2 - 13	15	11	0.7 - 33	121	22	94 - 170	433	134	229 - 672	243	82	73 - 346
Milk (325 / 835 kJ, 4 g protein, 5 / 10 g fat, 10 / 20 g CHO, 110 mg P, 65 mg Na, 185 mg K)*																					
Moderate energy	324	94	163 - 475	4	1	2.6 - 5.9	3	1	0.3 - 4.9	9	5	0.6 - 15.9	112	22	61 - 157	64	13	34 - 91	187	33	113 - 243
High energy	835	344	505 - 1764	4	1	2.6 - 5.9	11	9	2.5 - 39.9	22	7	11.5 - 30	112	22	61 - 157	64	13	34 - 91	187	33	113 - 243
Starch – low potassium (350 / 835 kJ, 2 g protein, 0 / 10 g fat, 20 g CHO, 40 mg P, 70 mg Na, 50 mg K)*																					
Low energy	349	82	152 - 486	2	1	1 - 4.3	1	1	0 - 4	19	7	2.2 - 37.2	39	15	15 - 75	71	67	0 - 227	49	21	6 - 100
High energy	835	345	507 - 2 165	2	1	1 - 4.3	9	8	0.1 - 35	19	7	2.2 - 37.2	39	15	15 - 75	71	67	0 - 227	49	21	6 - 100
Starch – high potassium (350 / 835 kJ, 2 g protein, 0 / 10 g fat, 20 g CHO, 40 mg P, 70 mg Na, 245 mg K)*																					
Low energy	349	82	152 - 486	2	1	1 - 4.3	1	1	0 - 4	19	7	2.2 - 37.2	39	15	15 - 75	71	67	0 - 227	245	96	118 - 418
High energy	835	345	507 - 2 165	2	1	1 - 4.3	9	8	0.1 - 35	19	7	2.2 - 37.2	39	15	15 - 75	71	67	0 - 227	245	96	118 - 418
Vegetable (90 kJ, 1 g protein, 0 g fat, 2 g CHO, 20 mg P, 20 mg Na, 75 / 150 / 270 mg K)*																					
Low K	90	52	8 - 247	1	1	0 - 3	0.2	0.2	0 - 5.6	2	2	0 - 7	21	12	2 - 50	18	32	0 - 146	76	26	17 - 116
Moderate K	90	52	8 - 247	1	1	0 - 3	0.2	0.2	0 - 5.6	2	2	0 - 7	21	12	2 - 50	18	32	0 - 146	152	22	121 - 191
High K	90	52	8 - 247	1	1	0 - 3	0.2	0.2	0 - 5.6	2	2	0 - 7	21	12	2 - 50	18	32	0 - 146	270	58	203 - 419
Fruit (250 kJ, 0.5 g protein, 0 g fat, 10 g CHO, 15 mg P, 5 mg Na, 95 / 170 / 240 mg K)*																					
Low K	252	114	64 - 509	0.5	0.3	0.1 - 1.2	0	0	0 - 1	12	7	1 - 26	14	6	2 - 26	4	3	0 - 11	94	25	14 - 119
Moderate K	252	114	64 - 509	0.5	0.3	0.1 - 1.2	0	0	0 - 1	12	7	1 - 26	14	6	2 - 26	4	3	0 - 11	168	23	121 - 194
High K	252	114	64 - 509	0.5	0.3	0.1 - 1.2	0	0	0 - 1	12	7	1 - 26	14	6	2 - 26	4	3	0 - 11	235	37	127 - 284
Beverages (10 / 300 kJ, 0 g protein, 0 g fat, 5 g CHO, 5 mg P, 10 mg Na, 20 mg K)*																					
Energy	298	118	150 - 522	0.1	0.4	0 - 1.3	0.0	0.1	0 - 0.5	7	7	0 - 22.5	5	6	0 - 19	12	12	0 - 35	18	20	1 - 67
Non-energy	9	5	5 - 16	0.1	0.4	0 - 1.3	0.0	0.1	0 - 0.5	7	7	0 - 22.5	5	6	0 - 19	12	12	0 - 35	18	20	1 - 67
Sugar (155 kJ, 0 g protein, 0 g fat, 10 g CHO, 0 mg P, 0 mg Na, 10 mg K)*																					
	154	19	120 - 177	0.1	0.1	0 - 0.3	0	0.1	0 - 0.2	9	1	7 - 10	0.8	0.8	0 - 2	2	2	0 - 6	11	14	0 - 36
Fat (160 kJ, 0 g protein, 5 g fat, 0 g CHO, 0 mg P, 45 mg Na, 0 mg K)*																					
	162	25	121 - 217	0.1	0.1	0 - 0.4	4	0.8	2.7 - 5.4	0.3	0.5	0 - 1.6	1	1.2	0 - 4	47	55	0 - 164	1	1	0 - 4

* Rounded off average values used in the final exchange lists.

Note: Outliers are highlighted in the lists as exceptions and were excluded from these calculations.

CHO = carbohydrate; P = phosphorus; Na = sodium; K = potassium.

Table III.	Comparison of Foodfinder 3 (FF3) and the Renal Exchange Lists (REL) for all food items included in the exchange lists (N = 381)						
	Mean		SD		Correlation		Difference between FF3 and REL†
Nutrient	FF3	REL	FF3	REL	r	p-value	p-value
Energy	343	341	286	234	0.82	0.0000*	0.8557
Protein	2.8	2.7	2.9	2.7	0.97	0.0000*	0.0003*
Phosphorus	47	46	42	38	0.91	0.0000*	0.8580
Potassium	65	64	114	102	0.90	0.0000*	0.4231
Sodium	115	116	83	77	0.90	0.0000*	0.9781
Fat	3.1	3.4	5.1	4.1	0.75	0.0000*	0.0969
Carbohydrate	9.5	8.9	9.9	8.7	0.84	0.0000*	0.0537

*Significant at $p < 0.05$.

†t-test for dependent samples.

was too imprecise to achieve protein goals.[4] This was ascribed to the number of items in each list which did not reflect the variety of foods actually eaten by study participants, so that they had to select portion sizes from related but not identical food items. In the latter study there was also a large variation in the protein content of food items grouped in the same list. Especially when dealing with low-protein diets, small variations in protein intake can result in high deviations from prescribed intake. For example, if the protein content of fruit and vegetables is ignored, protein intake would be underestimated by about 11%. Although the addition of more outliers and more sub-groups would certainly lead to less variation in nutrient content and narrower ranges within a particular list, it may result in exchange lists that are too complex for easy implementation. These are issues that need to be considered when the lists are revised, keeping in mind that one has to strike a balance between a high level of precision and lists that are easy to understand and implement in clinical practice.

Comparison between Foodfinder 3 and renal exchange list values for all food items included in the exchange lists showed highly significant correlations for all nutrients but a significant underestimation of protein content by 0.1 g per food item (all food items). Although this may seem irrelevant in day-to-day clinical practice, it was still a surprising result, given the fact that we used protein content to determine portion sizes. Several potential determinants were identified that might explain these findings. Firstly, the difference can be explained by the fact that, in addition to protein content, we also had to keep portion sizes realistic, which often led to deviation from the calculated portion size based on protein content. Secondly, true to the concept of exchange lists, average values were used when compiling the exchange lists so that individual food items in the exchange lists almost always deviate from the actual value. Thirdly, average values of exchange lists were rounded off for ease of implementation in clinical practice, obviating the need for digital precision.

In the case of carbohydrates, the difference between Foodfinder and the exchange lists almost reached significance (p = 0.0537). Possible reasons for this may be found in the fruit list, with fruit juices and canned fruit containing much higher amounts of carbohydrate and energy compared with fresh fruit. This pushes up the average carbohydrate content of the fruit list, whereas patients tend to eat mostly fresh fruit because they are often on fluid-restricted diets. With the next revision of the exchange lists, fruit juices should preferably be shifted to the beverage list, or analysed separately for carbohydrate and energy content. Another explanation may be the fact that energy-containing beverages are much higher in carbohydrate content than non-energy containing beverages. This list should therefore preferably be analysed separately for carbohydrate content along with energy content. Recommendations based on our experience with these exchange lists now need to be tested among renal dietitians before such changes are implemented.

To overcome the problem of imprecision, the MDRD Study[4] decided to use an alternative strategy, namely counting the grams of protein instead of using the exchange system. This method requires the use of actual protein values (and other relevant nutrients), more extensive training of participants and the use of self-monitoring tools for daily protein counting. Although this level of precision is seldom necessary in clinical practice, the newly developed South African Renal Exchange Lists provide the required data for nutrient counting for use by dietitians and selected highly motivated patients.

A limitation of the exchange lists, in addition to those relating to precision mentioned above, is that the lists are too complex to be handed out to patients in their current format. It is therefore recommended that the lists be adapted by dietitians for use in their particular circumstances and patients. Another limitation is that the lists have not yet been tested for precision in clinical practice. People tend to eat only a relatively small variety of food items on a regular basis as opposed to the full number of food items included in the exchange lists. This may lead to over- or underestimation of nutrients in clinical practice, despite the level of precision that was obtained in this study. Clinical efficacy of the exchange lists is an area that needs to be further researched among a representative sample of South African renal patients.

Conclusions and recommendations

A set of renal exchange lists has been developed and tested for use in South African persons with renal failure, and the complete lists can be downloaded free of charge from the website of the Nutrition Information Centre of the University of Stellenbsoch (NICUS) at **http://www.sun.ac.za/NICUS**. Despite the small but significant underestimation of protein content of food items, the lists appear to be of sufficient precision for use in clinical practice. Problems with the implementation of the lists have been addressed in the first round of testing and the lists are now available as an educational tool for renal dietitians. We anticipate further teething problems as dietitians start to implement the lists in clinical practice, and ongoing refinement of the lists is seen as a high priority. Specific aspects that need to be considered during the next revision include the use of outliers/sub-groups, adaptations to correct for possible overestimation or underestimation of selected nutrients, the addition of an additional list for enteral products or supplements/formulas, and adaptation of the current exchange lists for use in patients with diabetic nephropathy.

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