Assesment of Comorbıdıty in Perıtoneal Dıalysıs Patıents

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Comorbidity is defined as occurence of more than one disorder in the same patient. Predicting the effects of different comorbid conditions on a certain patient or patient groups's outcome, mainly on their mortality is important not only for the academic and/or medical reasons, but also in evaluating the effectiveness of certain treatments or treatment modalities, comparing them with the others, recommending the right treatments to our patients, predicting their treatment costs, planning health expenditure in general scale and eventually the health system itself.

Either on peritoneal dialysis (PD) or on hemodialysis (HD), end stage renal disease patients may have multiple comorbidities such as diabetes, hypertension, hyperlipidemia, cardiovascular disease and several others. On the other hand, during thr last decade, the fastest growth in dialysis population in most countries has occurred in 65 years and older patient group who are prone to have more severe and more complicated comorbidities comparing to the younger patients (1).

The recognized importance of comorbidities in general medicine has led to the development of standart comorbidity indices suitable for simple, easy and valid estimation of death from comorbid diseases in certain patient groups (2), most popular ones to be the Charlson, Khan and Davies Comorbidity Indices. The main idea used in those indices is simple; assigning risk scores to each comorbid disease and adding them to each other in order to get the final risk score for a certain patient or patient group. For example Charlson Comorbidity Index contains 19 categories of comorbidity which are primarily defined using ICD-9-CM diagnosis codes. Each category has an associated annual mortality risk score taken from the general population statistics or from a certain cohort of patients. In CCI, these categories and their risk scores (= weight or hazard ratios) are as follow:

CCI and other comorbidity indices have succesfully been used in several studies and found to be useful in dialysis patients and also in PD patients per se (1, 3, 4,5). On the other hand, indices derived from a non-ESRD, general population may not seem to be the best thing to do, because their use in ESRD patients assumes that the influence of comorbid conditions are equal in ESRD patients and general population; which is not true. Therefore, as a unique patient population with several modality-spesific problems, ESRD patients population may deserve to have their own modifications of comorbidity indices. Thus, some indices such as CCI has been modified per the needs of dialysis patient population in order to see if they would become more reliable tools (1, Table I). Most such studies have been using the renal patient survival data, mostly coming from cohort studies and other data derived from large registries such as USRDS. Data from those reliable sources have shown the different risk patterns of dialysis population which may necessitate at least some modifications on comorbidity indices.

Table I
Charlson Comorbıdıty Index Rısk Scores of Comorbıdıty Varıables And Modıfied Scores for ESRD Patıents

Comorbidity Variables	Original Score (Ref. 2)	ESRD Score (Ref. 1)
Myocardial infarction	1	2
Congestive heart failure	1	2
Peripheral vascular disease	1	1
Cerebral vascular disease	1	2
Dementia	1	1
Chronic lung disease	1	1
Rheumatological disease	1	1
Peptic ulcer disease	1	1
Mild liver disease	1	*
Diabetes without complications	1	2
Hemiplegia	2	*
Diabetes with complications	2	1
Neoplasia	2	*
Moderate/severe liver disease	3	2
Metastatic disease	6	10
Leukemia	2	2
Lymphoma	2	5
Human immunodeficiency disease	6	*
Renal disease	2	Dropped

As a good example for such attempts , Fried et all. published a study using Southern Alberta Renal Program and Alberta Bureau of Vital Statistics survival data and made a modification of CCI. Categories from both sources were evaluated with Cox Proportional Hazards model in order to determine their mortality risk scores. First of all, all patients in the group already had end stage kidney failure and

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the last variable in Table I; 'renal disease' had to be dropped from the comorbidity variable list. Further calculations have shown that in ESRD patients, myocardial infarction, congestive heart failure,cerebral vascular disease and diabetes received slightly higher scores (1+1→2) while metastatic disease (6+4→10 scores), lymphoma (2+3→5 scores) had impressively higher impact on patient survival. Neoplasm had a very small hazard ratio and was dropped from the list. Diabetes with complications (defined as presence of retinopathy, neuropathy or diabetic nephropathy) had a smaller weight in ESRD population (2-1→1 score). This was most likely due to high incidence of advanced diabetes with its most complications in the patient population. Mild liver disease only had a small impact and it was combined with moderate/severe liver disease category. Similarly, hemiplegia and HIV virus carriage state were not included in the new list. But unexpectedly, survival analysis with Kaplan-Meier survival curves, has shown almost no difference between the original and modified CCI's and the authors have concluded that the original CCI, without even any modifications was a valid index to be used in ESRD patient population. Other indices such as scoring method in CHOICE study and some others may be other examples (5, 6).

But the problem with assesment of comorbidity effect on dialysis patient survival is certainly not confined to find out that how many comorbidity hazard ratios should have to be assigned to certain disease categories in ESRD patient groups. We have several other questions still need to be answered: Should we do the morbidity assesment in incident (newly started) or prevelant (existing) patients? Each option has it's own pro's and con's. If we do it on incident patients how long should we wait before making the first assesment? As soon as the patient starts dialysis? 30 days or 90 days after the initiation of dialysis? What should have to be done when patients switch from one dialysis mode to another? Should we add parameters to calculate the disease severity? Are the hazards on patients really proportional and do not change with time, as it is assumed in Cox Proportional Hazards Model? Should we add risk variable list some other parameters such as albumin or PTH levels, nutritional and adequacy parameters, some dialysis data such as access situation in HD or peritonitis rate in PD patients? How can we measure the differences in the same dialysis modality such as use of cyclers, erytropoeitin, connect or disconnect systems, PD solutions with different compositions such as low-standart calcium, icodextrin and the others?.

As a conclusion, we need more studies before finding the 'perfect method' for comorbidity analysis in dialysis patient population. Those studies should also be designed as multicenter-multinational studies in order to minimize phisician bias, national bias etc.

Note: A SAS statistical patch is available for calculating CCI, for further information please visit:
http://www.umanitoba.ca/centres/mchp/concept/dict/charlson.index.html

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