Introduction

Studies examining the link between research evidence and clinical practice have consistently shown gaps between the evidence and current practice. Some studies in the United States suggest that 30%–40% of patients do not receive evidence-based care, while in 20% of patients care may be not needed or potentially harmful. However, relatively little information exists about how to apply evidence in clinical practice, and data on the effect of evidence-based guidelines on knowledge uptake, process of care or patient outcomes is limited. ***.(Locatelli et al., 2004)***

Appropriately then, the care of dialysis patients has been the prime focus of nephrology, particularly after the widespread availability of maintenance dialysis when it became evident that mortality of dialyzed patients was high and their quality of life far from adequate.***(Eknoyan et al,2002)***

In recent years, specific clinical guidelines have been developed to optimize the quality of anemia management secondary to chronic kidney diseases (CKD). As a result, the National Kidney Foundation Kidney Disease Outcome Quality Initiative (K\DOQ I) guidelines and the Renal-European Dialysis and Transplantation Association best practice guidelines have been published in USA & Europe. Therefore; clinical practice guidance help individual physician and physicians as group to improve their clinical performance and thus raise standard of patient care

towards optimum levels, They may also help to insure that all institution provide an equally good base line standard of care ***(Cameron,1999).***

Guidelines practiced on anemia and actual practices are much different with different places and patients according to treatment. Moreover, in individual countries and individual units within countries local circumstances relating to economic conditions; organization of health care delivery or even legal constraints may render the immediate implementation of best practice guidelines difficult or impossible. Nevertheless, they provide a goal against which progress can be measured ***(Locatelli et al., 2004).***

Dialysis Outcomes and Practice Patterns Study (DOPPS) has observed a large variation in anemia management among different countries. The main hemoglobin concentration in hemodialysis patient varied widely across the studied countries ranging between 8g/dl to 11g/dl. The percentage of prevalent hemodialysis patient receiving erythropoietin stimulating agent 'ESA' has increased from 75% to 83%. The percentage of HD patient receiving iron varies greatly among DOPPS countries range from 38% to 89%, ***(Locatelli et al., 2004).***

There are challenges in implanting clinical guidelines in medical practice. Overall DOPPS data which show that, despite the availability of practice guidelines for treatment of renal anemia, wider variation in anemia management exists as gap between what is recommended by the guidelines and is accomplished in every day clinical practice. Compliance with clinical guidelines is an importance indicator of quality and efficacy of patient care, at the same time their adaptation in clinical practice may be initiated by numerous factors including; clinical experts, patient

performance, constrains of public health policies, community standard, budgetary limitation and methods of feeding back information concerning current practice ***(Cameron, 1999).***

End-stage renal disease (ESRD) is one of the main health problems in Egypt. Currently, hemodialysis represents the main mode for treatment of chronic kidney disease stage 5 (CKD5), previously called ESRD or chronic renal failure ***(Afifi, 1999).***

Although hemodialysis is often used for treatment of ESRD, no practice guidelines are available in Egypt. Healthcare facilities are seeking nowadays to develop practice guidelines for the sake of improving healthcare services ***(Ministry of Health and Population, 1999).***

Aim of the Work

1. To study the pattern of current clinical practice in hemodialysis prescription in regular hemodialysis patients in Egypt and to compare this pattern with standard international guidelines in hemodialysis prescription (K/DIGO 2010), stressing on anemia, bone disease management and adequacy of dialysis.

2. Statement of the current status of dialysis pattern in Egypt (questionnaire)

Chronic Kidney Disease (CKD)

1. Definition and Staging of Chronic Kidney Disease

CKD is ***defined as*** the presence, for at least 3 months, of evidence of kidney damage with an abnormal Glomerular filtration rate (GFR) or, alternatively, by a GFR below **60** mL/min/1.73 m^2 body surface area ***(National Kidney Foundation, 2002).***

Kidney damage is defined as pathologic abnormalities or markers of damage, including abnormalities in blood or urine tests or imaging studies. The National kidney foundation (NKF) guidelines use a five-stage schema based on the reduction in GFR to help classify the severity of CKD. An international position statement added modifiers for noting whether a patient is treated with dialysis or transplantation *(Table 1)*. ***(National Kidney Foundation, 2002).***

In essence, this staging system recognizes that the progressive decrement in renal function gives rise to common complications(e.g., hypertension, anemia, hyperparathyroidism) and management issues (e.g., hepatitis B vaccination, dietary modification, patient education) that are independent of the underlying condition that caused the kidney damage ***(National Kidney Foundation, 2002).***

*Kidney failure (CKD Stage 5):

Kidney failure is defined as either **(1)** GFR **<15** mL/min/1.73 m^2, which is accompanied in most cases by signs and symptoms of uremia, or treatment by dialysis, **or (2)** a need for initiation of kidney replacement therapy (dialysis or transplantation) with GFR **≥ 15** mL/min/1.73m^2. Approximately **98** % of patients in the United States begin dialysis at GFR < 15 mL/min/1.73 m^2 ***(Obrador et al., 1999).*** Kidney failure is not synonymous with end-stage renal disease (**ESRD**).

Table 1: Stages of Chronic Kidney Disease

Stage	**Description**	**GFR (mL/min/1.73 m^2)**
1	Kidney damage with normal or ↑ GFR	≥ 90
2	Kidney damage with mild ↓ GFR	60–89
3	Moderate ↓ GFR	30–59
4	Severe ↓ GFR	15–29
5	Kidney failure	< 15 (or dialysis)

(National Kidney Foundation, 2002)

2. Incidence and prevalence of ESRD.

■ Incidence of ESRD in the United States

In the United States, ESRD is tracked by the U.S. Renal Disease Registry (**USRDS**) and detailed reports are published annually. The **2009** report includes data up until **2007**. In that year, **111,000** new patients commenced treatment with renal replacement therapy in the United States, equivalent to an age-, gender-, and race-adjusted rate of **354** per million population (**pmp**) ***(USRDS, 2009).*** On the basis of the anticipated

demographic changes in general population and of the sustained increase in **diabetes**, it is estimated that, by **2015**, the incidence rate for ESRD will have increased to **136,166** (110,989–164,550) cases per year (***Gilbertson et al., 2005).***

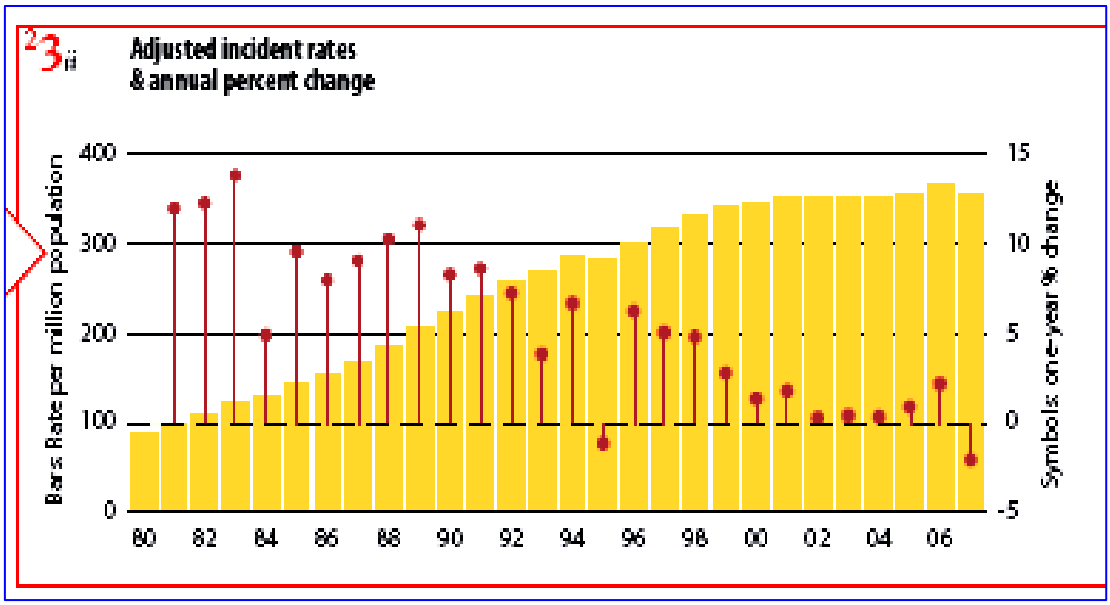

Figure 1*: Adjusted U.S. incidence rates of ESRD and annual percent change.* ***(U.S. Renal Data System: USRDS 2009).***

■ ***Prevalence of Chronic Kidney Disease.***

In **2003**, data from the US population-based Third National Health and Nutrition Examination Survey (NHANES III) reported that the total prevalence of chronic kidney disease (CKD) in the US adult population was 11% ***(Coresh et al., 2003)***. Data on the different stages of CKD among contemporary U.S. adults ***(NHANES 1999–2006)*** show that, using a single creatinine-based GFR, **3.2**, **4.1, 7.8**, and **0.5** %, respectively, have CKD of Stages 1, 2, 3, and 4–5. Using instead a single GFR based on cystatin C, the corresponding proportions are **4.0**, **3.9**, **6.4**, and **0.6** % ***(USRDS, 2009).*** In Europe, the prevalence of CKD is very similar to that in the US,***(Hallan et al., 2006)*** but the prevalence is higher in Asia and

Australia ***(Hallan and Vikse, 2008).*** Disturbingly, the prevalence of CKD continues to increase, with NHANES data showing that CKD prevalence increased by **30**% between 1990 and 2000 ***(Coresh et al., 2007).***

■ Prevalence of End-Stage Renal Disease in the United States

In **2007**, a total of **527,283** patients were treated with Renal Replacement Therapy (RRT) in the United States, equivalent to a rate per million populations of **1665**. The prevalence of ESRD has grown consistently over the last several decades, as a result of both the increased incidence rate and better survival rates. (**Fig. 2**) ***(U.S. Renal Data Systems, 2009).***

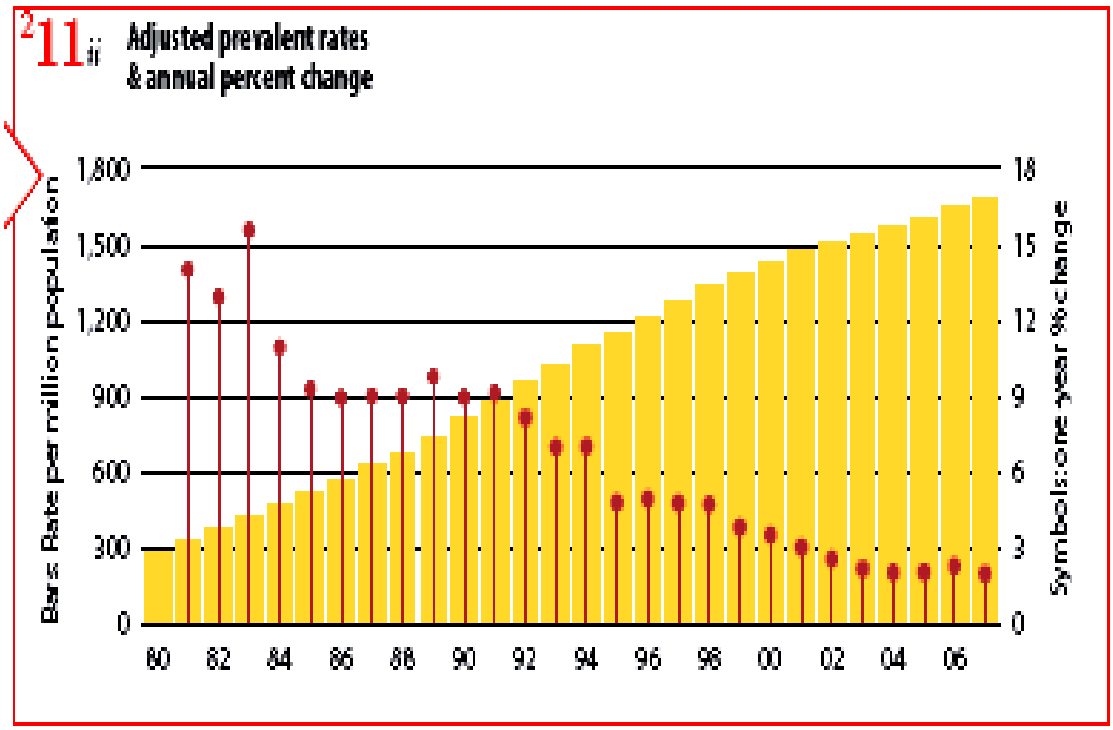

Figure 2*: Adjusted U.S. prevalence rates of ESRD and annual percent change. (U.S. Renal Data System: USRDS* ***2009****).*

■ Incidence and Prevalence of ESRD: Global Comparisons

The occurrence of ESRD varies widely between different countries and, on many occasions, within different regions of the same country ***(U.S. Renal Data Systems, 2009).***

Taiwan, Mexico, and the United States report the highest rates of incident ESRD, at 415, 372, and 361 per million population, respectively. Reported rates are lowest in Bangladesh, Russia, and Pakistan, at 13, 28, and 29 per million populations, respectively. Diabetes mellitus (DM) as a primary cause of ESRD accounts for a large proportion of incident ESRD patients. Malaysia, for example, reports a 2007 incident rate of 143 per million populations, and nearly 59 % of these patients have diabetes as their primary cause of renal failure. New Zealand, Israel, Taiwan, Japan, the United States, the Republic of Korea, and Hong Kong all report rates of ESRD due to diabetes exceeding 40 %. Prevalent rates for 2007 were highest in Taiwan and Japan, at 2,288 and 2,060 per million population, respectively, followed by the United States and Germany, at 1,698, and 1,114 ***(U.S. Renal Data Systems, 2009).***

Hemodialysis is the most common mode of dialysis therapy worldwide, evidenced by data showing that, in nearly 75 % of reporting countries, at least 80 % of patients are on this mode of therapy. This is not the case, however, in countries such as Hong Kong and Mexico, where peritoneal dialysis is provided to 80 and 66 % of patients, respectively, (In Hong Kong, **4 of 5** prevalent dialysis patients were treated with **CAPD**/**CCPD** in 2007). Home hemodialysis therapy is provided to nearly 10 % of patients in Australia and 16 % of patients in New Zealand. Renal transplant rates are many times a reflection not only of a country's healthcare system, but of cultural diversities as well. Transplant rates are

less than 10 per million population in countries such as Hong Kong, Thailand, Malaysia, Russia, Romania, and Bangladesh, in contrast to rates exceeding 50 per million in the Netherlands, Norway, the United States, and Mexico. Rates of functioning grafts reach 551 and 526 per million, respectively, in Norway and the United States, but are less than 30/ million in Russia, Romania, and Bangladesh ***(U.S. Renal Data Systems, 2009).***

3. Causes of CKD:

Tables (2) and (3) show that the origin of renal disease in new patients on haemodialysis (HD) (incident HD patients) has a very wide array with different etiologies. These etiologies differ markedly between countries. For example, glomerulonephritis accounts for about **15** % of ESRD in Germany, but only 8.7 % in the United States Renal Data System (USRDS) report ***(Bommer, 2002; USRDS, 2005).***

Table (2): Kidney disease incidence in HD patients by cause: USA (USRDS; 2005):

Cause	Patients (n)	Proportion of total (%)	Change/year 1991–1995 (%)	Change/year 1995–1999 (%)
Diabetes	32 016	44.8	9.6	9.8
Hypertension	19 683	27.6	2.3	7.8
Glomerulonephritis	6242	8.7	3.3	3.5
Cystic kidney disease	1490	2.1	3.2	3.9
Other urological diseases	1301	1.8	2.3	6.2
Total	71 421	100	6.3	7.3

(USRDS; 2005).

Table (3):Classification of CKD by diagnosis and prevalence among patients with kidney failure:

Disease	**Major Types (Examples[a])**	**Prevalence among patients with kidney failure[b]**
Diabetic kidney disease	*Type I and type II diabetes*	33 %
Nondiabetic kidney disease	*Glomerular diseases* (Autoimmune disease, systemic infections, drugs, neoplasia)	19 %
	Vascular disease (hypertension, renal artery disease,)	21 %
	Tubulointerstitial diseases (Urinary tract infections, stones, obstruction, drug toxicity)	4 %
	Cystic diseases (polycystic kidney disease)	6 %
Diseases in transplant recipients	Allograft nephropathy (chronic rejection)	NA[c]
	Drug toxicity (cyclosporine or tacrolimus)	
	Recurrent disease (glomerular disease)	
	Transplant glomerulopathy	

(NKF,2002).

4. End-Stage Renal Disease in The Developing World:

■ ***Prevalence***

In the developing world, prevalence of ESRD is proportionate to national economy ***(Barsoum, 2002; Barsoum, 2006).*** The major determinants of prevalence are the capacity and competence of RRT programs, both of which are financially demanding ***(Barsoum and Sitprija, 2006).*** The prevalence rate of ESRD in Egypt during **1996** was **225** PMP ***(Afifi, and Karim, 1999; Shaheen FA and Al-Khader AA, 2005).***

■ ***Incidence***

The incidence of new cases of ESRD in the Tropics (including **Egypt**) is generally within the range of **100** to **150** pmp ***(Barsoum, 2002).*** These numbers are far lower than those reported in the West, where the incidence is three - to six-fold higher ***(US Renal Data System, 2005).*** Although under-reporting may be responsible for this discrepancy, it has been estimated that the lower incidence of diabetes ***(Wild et al., 2004 - Barsoum, 2005)*** in the Tropics can account for the difference (**Figs. 3 and 4**). This is quite alarming given that the incidence of diabetes is expected to boom in tropical countries during the coming two decades ***(Wild et al., 2004),*** which will undoubtedly reflect on the incidence of ESRD.

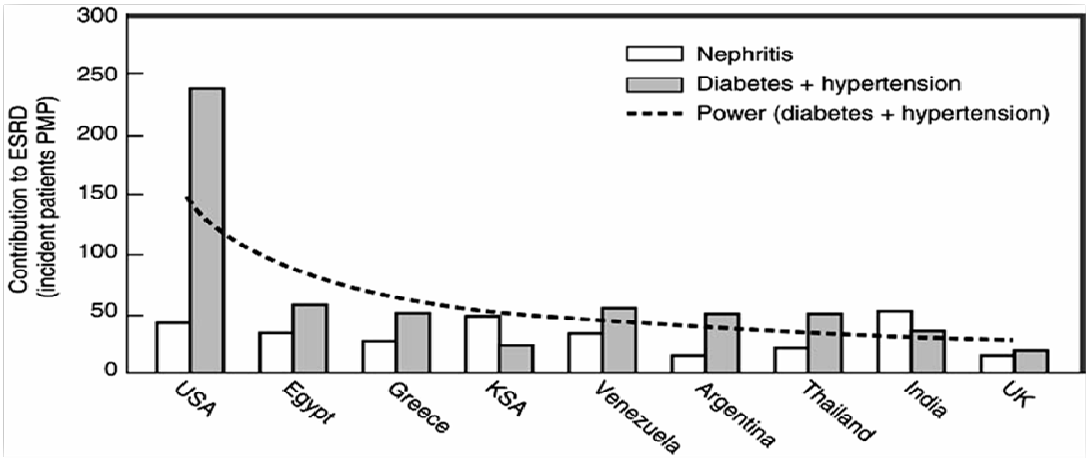

Figure 3. *Effect of diabetes and hypertension on the incidence of ESRD in six developing countries compared to the USA. Note the reflection of the polynomial trend line for diabetes and hypertension as opposed to the incident rates of glomerulonephritis* ***(Barsoum RS, and Sitprija V, 2006).***

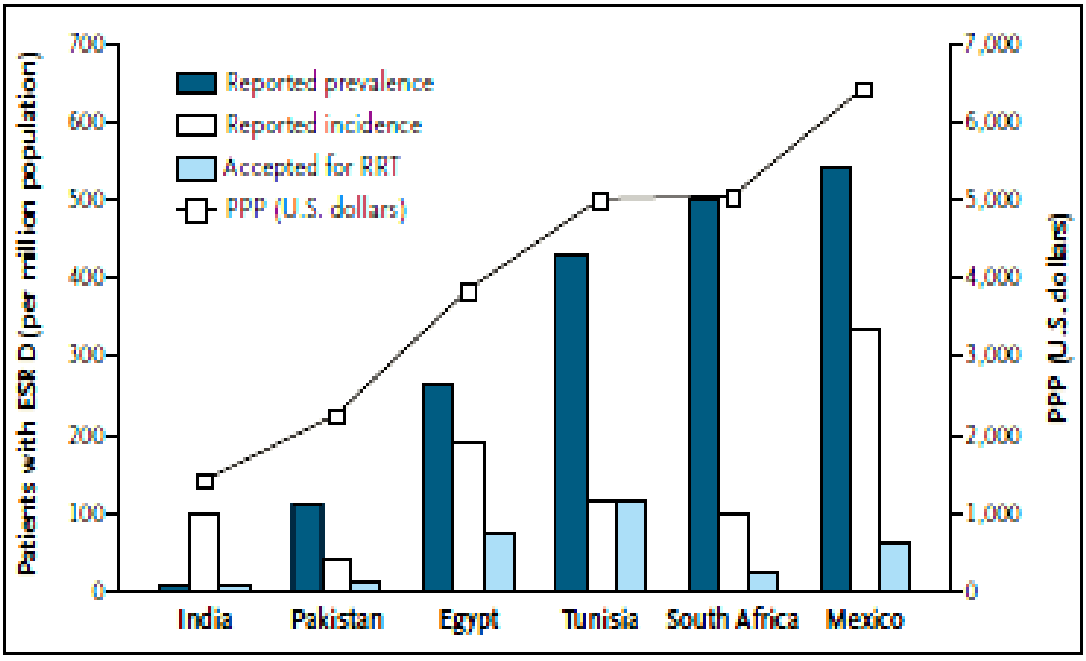

Figure (4): Reported Prevalence and Incidence of ESRD and Rates of Acceptance for Renal-Replacement Therapy (RRT), in Relation to Wealth. *ESRD denotes end-stage renal disease. Purchasing power parity (PPP) is an economic measure that compares annual incomes per capita on the basis of purchasing power for goods and services. Data are from the World Bank,* ***2001 (Barsoum RS, 2006).***

■ ***Etiology of Chronic Kidney Disease***

Chronic glomerulonephritis and interstitial nephritis constitute the principal causes of tropical chronic kidney disease ***(Barsoum, 2002)***. This reflects the high prevalence of infections and intoxication. Of the principal bacterial infections, tuberculosis ranks quite high in India and the Arabian Gulf, being associated with ureteric strictures, back pressure, and chronic interstitial nephritis. Streptococcal infections of the throat and skin (complicating scabies) are responsible for chronic glomerular disease in a large number of African children. Of the viral infections, hepatitis C is currently the most important cause of progressive membranoproliferative glomerulonephritis in many countries, particularly Egypt. Several parasitic infections cause ESRD through ureteric obstruction (e.g., schistosomiasis in most of Africa), interstitial nephritis (e.g., Kala-azar in many African and Asian countries), and glomerulonephritis (e.g., malaria in West Africa, schistosomiasis in Africa and Latin America, filariasis in Nigeria) ***(Barsoum and Sitprija1997).***

The contribution of diabetes mellitus varies from 9.1% to 29.9% in different reports. More than 80 % of cases are type 2 insulin-resistant. End-stage diabetic nephropathy exhibits a constantly rising trend, attributed to increasing incident cases as well as improved survival on RRT. In a single center experience in Egypt, diabetic patients constituted 8.0 % of patients on chronic dialysis in 1980, **13.3** % in 1990, **18.7** % in 2000, and **24.3** % in 2003 ***(Barsoum, unpublished data).*** The prevalence of hypertensive nephrosclerosis among ESRD patients in the Tropics was reported between **13** % and **21** % ***(Barsoum, 2002; El-Khashab O, 2002).*** Other important causes of ESRD in the Tropics include urolithiasis with

subsequent obstruction and infection, chronic drug abuse, and possibly environmental pollution ***(Barsoum, and Sitprija, 1997).***

In **Egypt**, the principal causes of end-stage chronic renal disease (ESRD) are Chronic interstitial nephritis (**14 - 32**%) ***(Barsoum, and Sitprija, 1997)***; glomerulonephritis(**11-24**%),mostly mesangioproliferative and focal segmental sclerosis; diabetes (**5-20**%) and nephrosclerosis (**5-21**%). Obstructive/reflux nephropathy, attributed to urinary schistosomiasis, is common in Egypt (**7**%) ***(Barsoum, 2003).*** The percentage of diabetic patients in the dialysis population was **8.4** % in **1993** (***Afifi 2004)*** (**Table 4**)**.** Hypertension is responsible for **28** % of cases of ESRD in Egypt ***(Afifi, and Karim , 1999).*** ESRD of unknown etiology is responsible for **16.2** % of cases in Egypt, which is a high percentage in comparison with more industrialized countries ***(Afifi , and Karim , 1999).***

Table (4): Causes of CRF in Egypt

Causes	1980-1987	1988- 1990	1991-1993
Chronic pyelonephritis and obstructive uropathy	28.6%	26.6%	27.3%
Chronic glomerulonephritis	30.4%	22.8%	20.2%
Miscellaneous diseases	7.9%	9.4%	9.6%
Hypertensionand nephrosclerosis	5.7%	8.1%	8.6%
Diabetes mellitus	5.5%	8.5%	8.4%
Congenital diseases and polycystic kidney	2.5%	2.8%	2.6%
Unknown aetiology	17.6%	21.8%	23.3%

(Afifi 2004)