



Ain shams University  
Faculty of medicine  
Internal Medicine and Nephrology

# **Current Status of the Implication of the Clinical Practice Pattern in Hemodialysis Prescription in Regular Hemodialysis Patients in Egypt (Alsharqia)**

## **Thesis**

Submitted for partial fulfillment of Master Degree  
in Nephrology

**By**

**Mohammed mahmoudali**

**Diploma Of internal Medicine  
Ain shams University**

**Under Supervision of**

**Prof. Dr. Magdy Mohamed Saed Alsharkawy**  
Professor of Internal Medicine and Nephrology  
Faculty of Medicine – Ain Shams University

**Dr. Hesham Atef Abouleil**  
Professor assistant of Internal Medicine and Nephrology  
Faculty of Medicine – Ain Shams University  
**Faculty of Medicine**

**Ain Shams University**

**2014**



## **Acknowledgement**



*First of all, thanks to **Allah**, the Most Gracious, Most Merciful, for success in achieving work in my life, and for guiding me and giving me the strength to complete this work the way it is.*

*I would like to express my deepest thanks to **Prof Dr. Magdy Mohamed Saed Alsharkawy**, Professor of Internal Medicine and nephrology, Ain Shams University, for his close supervision, valuable instructions, continuous help, patience, advices and guidance. he has generously devoted much of his time and effort for planning and supervision of this study. It was a great honor to me to work under his direct supervision.*

*I would like to express my deepest thanks and gratitude to **Prof Dr. Hesham Atef Abouleil** assistant Professor of Internal Medicine and nephrology, Ain Shams University, for his kind supervision, indispensable advice and great help in this work.*

*I wish to express my great thanks and gratitude to **Dr. Yahya Makkeyah** Lecturer of Internal Medicine and nephrology, Ain Shams University, for his kind supervision, indispensable advice and great help in this work.*

*Last and not least, I want to thank all my family, my colleagues, , for their valuable help and support.*

*Finally I would present all my appreciations to my patients without them, this work could not have been completed.*

**Mohammed Mahmoud Ali**



# **Contents**

<b>1- List of abbreviations.....</b>	<b>I</b>
<b>2- List of tables.....</b>	<b>III</b>
<b>3- List of figures.....</b>	<b>V</b>
<b>4- Introduction.....</b>	<b>1</b>
<b>5- Aim of the work.....</b>	<b>3</b>
<b>6- Review of literature</b>	
➤ Chapter 1:hemodialysis.....	4-10
➤ Chapter 2:anemia in hemodialysis patient.....	11-29
➤ Chapter 3:mineral and bone disorder. ....	30-43
➤ Chapter 4:complications of hemodialysis.....	44-65
<b>7- Patients and Methods. ....</b>	<b>66-71</b>
<b>8- Results .....</b>	<b>67-103</b>
<b>9- Discussion. ....</b>	<b>104-114</b>
<b>10- Summary and Conclusion.....</b>	<b>115-118</b>
<b>11- Recommendations.....</b>	<b>119</b>
<b>12- References.....</b>	<b>120-136</b>
<b>13- Arabic summary.....</b>	<b>5-1</b>

---

---

## List of Abbreviations

Abbreviation	Name
<b>ESRD</b>	End-stage renal disease
<b>EPO</b>	Erythropoietin
<b>Hgb</b>	Hemoglobin
<b>GFR</b>	Glomerular filtration rate
<b>HD</b>	Hemodialysis
<b>CKD</b>	Chronic kidney disease
<b>PD</b>	Peritoneal dialysis
<b>DOQI</b>	Dialysis Outcomes Quality Initiative
<b>ESA</b>	erythropoiesis-stimulating agents
<b>HMW-ID</b>	high molecular weight iron-dextran
<b>LMW-ID</b>	low molecular weight iron-dextran
<b>IL-6</b>	interleukin 6
<b>BMP-6</b>	bone morphogenetic protein 6
<b>TNF</b>	tumor necrosis factor
<b>MBD</b>	mineral and bone disorder
<b>PTH</b>	parathyroid hormone
<b>CV</b>	cardiovascular
<b>SHPT</b>	secondary hyperparathyroidism

<b>DM</b>	diabetes mellitus
<b>IDH</b>	intradialytic hypotension
<b>SBP</b>	Systolic blood pressure
<b>HES</b>	Hydroxyethyl starch
<b>HTN</b>	Hypertension
<b>RAAS</b>	rennin-angiotensin aldosterone system
<b>ACE</b>	angiotensin converting enzyme inhibitors
<b>ARB</b>	angiotensin receptor blockers
<b>MI</b>	myocardial infarction
<b>cTnT</b>	Cardiac troponin T
<b>DDS</b>	Dialysis Disequilibrium syndrome
<b>HIT</b>	heparin-induced thrombocytopenia
<b>LMWH</b>	low molecule weight heparin
<b>UFH</b>	unfractionated heparin

## List of Tables

Table No.	Subject	Page
1	Key components of hemodialysis prescription	6
2	Clinical care of patients receiving hemodialysis	10
3	When to evaluate hemodialysis patient for anemia	15
4	Over view of currently available phosphate binders	36
5	Potential strategies to improve control of dietary phosphorus intake and adherence to phosphate	37
6	Gender and age distribution in the study population	72
7	Different causes of ESRD in the study population	73
8	Different comorbidities in the study population	74
9	Work status in the study population	75
10	Dependency status in the study population	76
11	Frequency of HD sessions/ WK in the study	77
12	Duration of HD session in the study population	78
13	Sponsoring status in the study in the study poulation	79
14	Type of vascular acess in the study population	80
15	Frequency of acess failure in the study population	81
16	Hemoglobin category in the study population	82
17	History of blood transfusion in the study population	83
18	History of ESA therapy in the study population	84

<b>19</b>	<b>ESA dose/ WK in the study population</b>	<b>85</b>
<b>20</b>	<b>History of iron injection in the study population</b>	<b>86</b>
<b>21</b>	<b>History of vitamin B complex use in the study</b>	<b>87</b>
<b>22</b>	<b>History of L- carnitine supplement in the study population</b>	<b>88</b>
<b>23</b>	<b>History vitamin D use in the study population</b>	<b>89</b>
<b>24</b>	<b>Vitamin D dose (ug/WK) in the study population</b>	<b>90</b>
<b>25</b>	<b>Average weight gain (KG) in the study population</b>	<b>91</b>
<b>26</b>	<b>Calcium levels in the study population</b>	<b>92</b>
<b>27</b>	<b>Phosphorus level in the study population</b>	<b>93</b>
<b>28</b>	<b>Calcium phosphorus product level in the study population</b>	<b>94</b>
<b>29</b>	<b>Types of complications during HD session in the study population</b>	<b>95</b>
<b>30</b>	<b>Viral status in the study population</b>	<b>96</b>
<b>31</b>	<b>Isolation of HBV <sup>+ve</sup> patients &amp;HCV <sup>+ve</sup> patients</b>	<b>97</b>
<b>32</b>	<b>Criteria of dialysate used in the study population</b>	<b>97</b>
<b>33</b>	<b>Dialysate sodium (mmol/L) used in the study population</b>	<b>98</b>
<b>34</b>	<b>Dialysate potassium (mmol/L) used in the study population</b>	<b>99</b>
<b>35</b>	<b>Dialysate calcium (mmol/L) in the study population</b>	<b>100</b>
<b>36</b>	<b>Dialysate magnesium (mmol/L) in the study population</b>	<b>101</b>
<b>37</b>	<b>Anticoagulation type in the study population</b>	<b>102</b>
<b>38</b>	<b>Anticoagulation dose in the study population</b>	<b>103</b>





## List of Figures

<b>Figure No.</b>	<b>Subject</b>	<b>Page</b>
<b>1</b>	Gender distribution in the study population	<b>72</b>
<b>2</b>	Different causes of ESRD in the study population	<b>73</b>
<b>3</b>	Different comorbidities in the study population	<b>74</b>
<b>4</b>	Work status in the study population	<b>75</b>
<b>5</b>	Dependency status in the study population	<b>76</b>
<b>6</b>	Frequency of HD sessions/week in the study population	<b>77</b>
<b>7</b>	Duration of HD session in the study population	<b>78</b>
<b>8</b>	Sponsoring status in the study population	<b>79</b>
<b>9</b>	Type of vascular access in the study population	<b>80</b>
<b>10</b>	Frequency of access failure in the study population	<b>81</b>
<b>11</b>	Hemoglobin category in the study population	<b>82</b>
<b>12</b>	History of blood transfusion in the study population	<b>83</b>
<b>13</b>	History of ESA therapy in the study population	<b>84</b>
<b>14</b>	ESA dose/ WK in the study population	<b>85</b>
<b>15</b>	History of iron injection in the study population	<b>86</b>
<b>16</b>	History of vitamin B complex use in the study population	<b>87</b>
<b>17</b>	History of L- carnitine supplement in the study population	<b>88</b>
<b>18</b>	History vitamin D use in the study population	<b>89</b>

<b>19</b>	Vitamin D dose (ug/WK) in the study population	<b>90</b>
<b>20</b>	Average weight gain (KG) in the study population	<b>91</b>
<b>21</b>	Calcium levels in the study population	<b>92</b>
<b>22</b>	Phosphorus level in the study population	<b>93</b>
<b>23</b>	Calcium phosphorus product level in the study population	<b>94</b>
<b>24</b>	Types of complications during HD session in the study population	<b>95</b>
<b>25</b>	Viral status in the study population	<b>96</b>
<b>26</b>	Criteria of dialysate used in the study population	<b>97</b>
<b>27</b>	Dialysate sodium (mmol/L) used in the study population	<b>98</b>
<b>28</b>	Dialysate potassium (mmol/L) used in the study population	<b>99</b>
<b>29</b>	Dialysate calcium (mmol/L) in the study population	<b>100</b>
<b>30</b>	Dialysate magnesium (mmol/L) in the study population	<b>101</b>
<b>31</b>	Anticoagulation type in the study population	<b>102</b>
<b>32</b>	Anticoagulation dose in the study population	<b>103</b>

## INTRODUCTION

Even though dialysis treatment is successful to ameliorate many of the clinical manifestations of the end stage renal disease (ESRD) and to postpone otherwise imminent death, dialysis patients still have higher mortality and hospitalization, as well as lower quality of life, compared with general population. The available clinical data have also shown that the overall mortality rate and outcomes vary substantially across facilities and countries(*Lopes et al.,2007*).

The observed variation in mortality across centers and countries raises the possibility that practices pattern may contribute to the variation in outcome. Also, the outcomes of dialysis patients can be modified by change in dialysis practice, suggesting that there is an association between practice pattern and outcome. Indeed, the dialysis outcomes and practice pattern study(DOPPS),initially performed in dialysis facilities from seven developed countries and now twelve ones, have greatly improving our understanding of dialysis practices that are associated with better outcomes(*Tentori et al.,2008*).

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(*Eknayan et al.,2002*).

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. (*Locatelli et al., 2004*).

Compliance with clinical guidelines is an important 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 backinformation 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**

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 , stressing on anemia, bone disease management and adequacy of dialysis.

## **Hemodialysis**

Fifty years ago, Belding Scribner and his colleagues at the University of Washington developed a blood-access device using Teflon-coated plastic tubes, which facilitated the use of repeated hemodialysis as a life-sustaining treatment for patients with uremia. The introduction of the Scribner shunt as it became known, soon led to the development of a variety of surgical techniques for the creation of arteriovenous fistulas and grafts. Consequently, hemodialysis has made survival possible for more than a million people throughout the world who have end-stage renal disease (ESRD) with limited or no kidney function. The expansion of dialysis into a form of long-term renal-replacement therapy transformed the field of nephrology and also created a new area of medical science, which has been called the physiology of the artificial kidney (*Scribner et al., 1960*).

### **Goals of Hemodialysis:**

Dialysis is defined as the diffusion of molecules in solution across a semipermeable membrane along an electrochemical concentration gradient. The primary goal of hemodialysis is to restore the intracellular and extracellular fluid environment that is characteristic of normal kidney function. This is accomplished by the transport of solutes such as urea from the blood into the dialysate and by the transport of solutes such as bicarbonate from the dialysate into the blood. Solute concentration and molecular weight are the primary determinants of diffusion rates. Small molecules, such as urea, diffuse quickly, whereas compartmentalized and larger molecules, such as phosphate,  $\beta_2$ -microglobulin, and albumin, and protein-bound solutes, such as p-cresol, diffuse much more slowly. In addition to diffusion, solutes may pass through pores in the membrane by

means of a convective process driven by hydrostatic or osmotic pressure gradients a process called ultrafiltration. During ultrafiltration, there is no change in solute concentrations; its primary purpose is the removal of excess total body water. (*Himmelfarb and Ikizler, 2010*)

For each dialysis session, the patient's physiological status should be assessed so that the dialysis prescription can be aligned with the goals for the session. This is accomplished by integrating the separate but related components of the dialysis prescription to achieve the desired rates and total amount of solute and fluid removal. By replacing kidney excretory function, dialysis is intended to eliminate the symptom complex known as the uremic syndrome, although ascribing particular cellular or organ dysfunction to the accumulation of specific solutes in uremia has proved to be difficult (*Locatelli et al., 2002*).