

Original Article

Adherence of Healthcare Professionals to Evidence-based Clinical Practice Guidelines in the Management of Hemodialysis Patients, Khartoum State, Sudan

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Abstract

Introduction: Hemodialysis (HD) is a complex procedure with many specifications and requires adherence to a set of particular clinical practice guidelines. These guidelines had already been established by globally acclaimed renal authorities and their implementation was shown to correlate with patients' morbidity and mortality. This study was conducted to evaluate the adherence of healthcare professionals to the evidence-based clinical practice patterns in Khartoum State HD units.

Methods: A cross-sectional study was conducted in Khartoum State HD units during the period from September 2010 to January of 2011. Data was collected from the healthcare professionals using a specially designed checklist. The checklist included the evidence-based clinical practice guidelines for the HD vascular access, HD adequacy, anemia of chronic kidney disease (CKD), nutrition, cardiovascular risk assessment, and hepatitis B and C virus infection control. Implementation of these guidelines was evaluated, and further graded using a Likert-type scale.

Results: Four randomly selected HD units were included in the study. The rate of implementation of the HD vascular access guidelines was 54.8%, adequacy guidelines 57%, anemia of CKD 68.8%, nutrition 58.4%, cardiovascular risk assessment 57%, and hepatitis B and C infection control guidelines was 79.2%. Overall, the four HD units assessed showed moderate deviations from the practice guidelines of anemia of CKD and hepatitis B and C infection control. Extreme deviations from the clinical practice guidelines were seen in HD vascular access practices, adequacy assessments, nutrition and cardiovascular risk assessment.

Conclusion: Hemodialysis services in Khartoum State are in need of great improvements regarding adherence to protocols and the standards of care.

Key words: Clinical practice guidelines; Hemodialysis; Sudan

The authors declared no conflict of interest

Introduction

Worldwide there had been a steady increase in the prevalence of patients with end-stage renal disease (ESRD), with an estimated annual growth rate of 6% [1]. In Sudan the overall prevalence of treated ESRD is 106 patients per million populations with intermittent hemodialysis (HD) being the dominant mode of renal replacement therapy available [2].

Despite the great improvement in dialysis procedures and equipment, HD remains a complicated therapy that requires coordinated efforts from the health care team. It had been shown that implementation of evidence-based clinical practice guidelines is the key to achieve the best possible outcomes in dialysis. The quality of delivered HD is known to predict HD patients' morbidity and mortality [3, 4].

According to previous reports the type of HD vascular access used, dialysis adequacy, management of the anemia of chronic kidney disease (CKD), cardiovascular diseases, patients' nutritional status and HD associated infections are all primary predictors of HD outcomes [3-7].

Many prospective studies showed that performing regular guidelines audits of the key aspects of HD practice patterns improves the clinical standards and eventually reduces HD patients' morbidity and mortality [7-9]. So far there are no previous reports evaluating where Sudan dialysis units stand in adherence to these guidelines. This study was conducted to determine the adherence of healthcare professionals to the evidence-based clinical practice guidelines in Khartoum State HD units.

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Table 1: Applied Likert scale for grading adherence to guidelines

| Grade | Adherence score |
|---------------------|-----------------|
| Adherent | > 95 - 100% |
| Mild deviations | > 80 - 95% |
| Moderate deviations | > 65 - 80% |
| Extreme deviations | > 50 - 65% |
| Nonadherent | ≤ 50% |

Methods

A cross-sectional hospital-based descriptive study was conducted in Khartoum State (Khartoum, Khartoum North and Omdurman cities) HD units, during the period from September 2010 to January 2011. There were 13 operational governmental HD units during the study period; a stratified, multi-stage systematic random sampling was used for selecting a number of representative HD units as a study sample.

The healthcare professionals in the selected HD units were targeted. Data was obtained by directly interviewing the renal physician in charge and a head nurse from each dialysis shift using a specially designed checklist. The checklist included details of the practice points that need to be implemented in order to fulfil the evidence-based clinical practice guidelines for HD vascular access, HD adequacy, anemia of CKD, nutrition, cardiovascular risk assessment, and hepatitis B and C viral infection control. The checklist details are summarized as follows [3, 4, 7]:

Hemodialysis vascular access guidelines: Evaluation included implementation of the practice points for patients' preparation for a permanent HD access, selection and placement of HD access, cannulation of fistulae and grafts and use of HD catheters, access monitoring and surveillance, detection and diagnostic testing for access dysfunction, treatment of fistula complications, prevention and treatment of catheter complications, and clinical outcome goals (total of 44 items).

Hemodialysis adequacy guidelines: Evaluation included the practice points for initiation of dialysis, measuring and expressing the HD dose, methods for blood sampling, the minimally adequate dialysis, control of volume and blood pressure, preservation of the residual renal function, and the quality improvement programs (total 29 items).

Anemia of CKD guidelines: Evaluation included the practice points for initiation of anemia work-up, anemia evaluation, target hemoglobin and hematocrit for

erythropoietin therapy, assessment of iron status, target iron levels, monitoring of iron status, administration of supplemental iron, administration of test dose of intravenous iron, oral iron therapy, routes of erythropoietin administration, initial erythropoietin therapy, monitoring of response to treatment, titration of dose, inadequate response to erythropoietin, possible adverse effects related to erythropoietin therapy, and blood cell transfusions in CKD patients (total 41 items).

Nutrition guidelines: Evaluation included availability of a dietician or nutrition specialist, the practice points for patients' counselling, assessment of nutritional status and attending to detected nutritional abnormalities (total 12 items).

Cardiovascular risk assessment guidelines: Evaluation included the practice points for risk factors assessment, cardiac imaging, and the management of CKD mineral and bone disorders (total 14 items).

Hepatitis B and C viruses infection control guidelines: Evaluation included the practice points for patients' screening, vaccination against hepatitis B virus and infected patients isolation (total 9 items).

Data analysis was done using Statistical Package for the Social Sciences version 17.0 (SPSS Inc., Chicago, IL) computer software. Dialysis units' adherence to recommended practice points in each guidelines domain was expressed as counts and percentages. A Likert scale was used to grade the overall adherence to guidelines as outlined in Table-1.

Significance testing between proportions was conducted where applicable using the Chi square test, with a P value of less than 0.05 considered significant.

The study was approved by the ethical committee of the University of Medical Sciences and Technology and the National Center for Kidney Diseases and Surgery. Prior to enrolment an informed consent was obtained from all participants.

Results

Four HD units were randomly selected from Khartoum State; two units from Khartoum, one from Khartoum North and the fourth from Omdurman city. These were Dr. Selma Center for Kidney Diseases Dialysis Unit (Dr. Selma Dialysis Unit), Khartoum Teaching Hospital Dialysis Unit (KTH Dialysis Unit), Kidney Transplanted Association Hospital Dialysis Unit (KTAH Dialysis Unit) and Omdurman Teaching Hospital Dialysis Unit (OTH Dialysis Unit). The four units provide HD services for a total of 781 adult patients Table-2.

Table 2: Characteristics of the hemodialysis units included in the study

| Dialysis units | Hemodialysis seats number | Hemodialysis patients number |
|--|---------------------------|------------------------------|
| Dr. Selma Center for Kidney Diseases | 27 | 243 |
| Khartoum Teaching Hospital Dialysis Unit | 32 | 210 |
| Kidney Transplanted Association Hospital Dialysis Unit | 25 | 225 |
| Omdurman Teaching Hospital Dialysis Unit | 13 | 103 |
| Total | 97 | 781 |

Table 3. Adherence to individual guidelines in the studied hemodialysis units

| Guidelines | Rate of compliance to guidelines (%) | | | |
|----------------------------------|--------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | Dr. Selma | KTH | KTAH | OTH |
| Vascular access | 35/44 (84.3%) Mild Deviations | 14/44 (32.3%) Nonadherent | 24/44 (43.3%) Nonadherent | 25/44 (59.3%) Extreme Deviations |
| HD adequacy | 21/29 (73.8%) Moderate Deviations | 11/29 (39%) Nonadherent | 16/29 (56.2%) Extreme Deviations | 17/29 (59.1%) Extreme Deviations |
| Anemia of CKD | 34/41 (84.2%) Mild Deviations | 21/41 (50.7%) Extreme Deviation | 33/41 (81.6%) Mild Deviations | 20/41 (50.8%) Extreme Deviation |
| Nutritional assessment | 8/12 (66.7%) Moderate Deviations | 8/12 (66.7%) Moderate Deviations | 4/12 (33.3%) Nonadherent | 8/12 (66.7%) Moderate Deviations |
| CVS risk assessment | 11/14 (75.8%) Moderate Deviations | 9/14 (62.7%) Extreme Deviations | 7/14 (48.8%) Nonadherent | 6/14 (40.5%) Nonadherent |
| Hepatitis B and C control | 9/9 (100%) Adherent | 7.5/9 (83.3%) Mild Deviations | 9/9 (100%) Adherent | 3/9 (33.3%) Nonadherent |

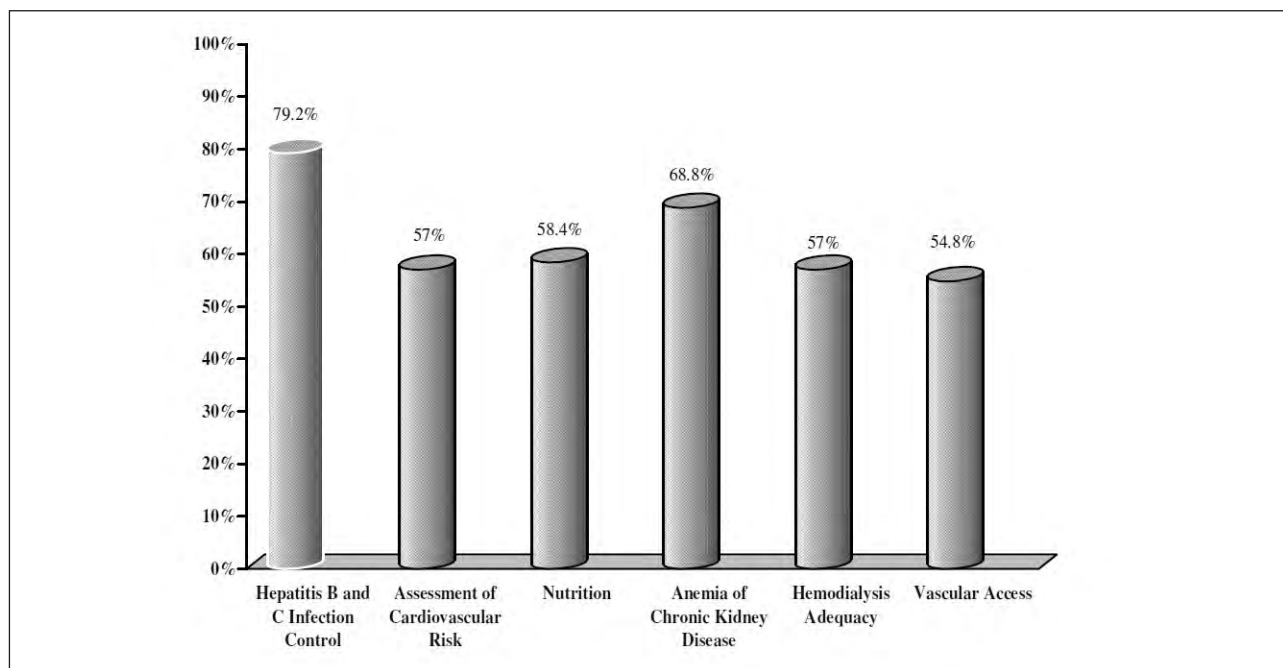
Dr. Selma: Dr. Selma Center for Kidney Diseases Dialysis Unit; KTH: Khartoum Teaching Hospital Dialysis Unit; KTAH: Kidney Transplanted Association Hospital Dialysis Unit; OTH: Omdurman Teaching Hospital Dialysis Unit; HD: Hemodialysis; CKD: Chronic Kidney Disease; CVS: Cardiovascular. $P < 0.0005$

Evaluation of adherence to evidence-based clinical practice guidelines using the six proposed parameters rated Dr. Selma Dialysis Unit as the best unit; it showed 84.3% adherence rate to the HD vascular access evidence-based practice points, 73.8% adherence rate to the HD adequacy practice points and 84.2% adherence rate to the anemia of CKD clinical practice points. Adherence to cardiovascular risk assessment and viral hepatitis infection control best practice points was 75.8% and 100%, respectively. Further rating and grading of all other dialysis units using the Likert scale is shown in Table-3. The superior rating of Dr. Selma Dialysis Unit

in all aspects was statistically significant, with the P value being less than 0.0005.

The overall mean adherence to the evidence-based clinical practice guidelines in all four units is summarized in Figure-1, this reflects the clinical practice patterns of Khartoum State HD units. According to the applied Likert scale, Khartoum State HD units show moderate deviations from the anemia of CKD management and hepatitis viruses infection control clinical practice guidelines; whereas extreme deviations from the HD adequacy, vascular access, nutrition and cardiovascular risk assessment practice guidelines were seen.

Figure 1: Adherence to clinical practice guidelines in Khartoum State HD units



Discussion

In Sudan dialysis replacement therapy is provided free of charge for all patients. Due to the continuously expanding patient pool and limited resources questions remain regarding the quality of care provided [10-13]. In this study assessment of adherence to evidence-based clinical practice guidelines was used as measure of the quality of care in our HD units [14]. The study clearly demonstrated the presence of significant deviations in practice patterns from the appropriate clinical standards; with a mean adherence rate of 62.5%.

It is crucial to keep in mind that vascular access continuous to be a leading cause for hospitalization and morbidity in patients with ESRD [4]. Previous studies had reported infection as a common cause of death among HD patients; accounting for 9.5 to 36% of deaths [15-18]. In the studied HD units major pitfalls were seen regarding the implementation of vascular access protocols for the prevention of catheter related infections. The principal steps for diagnosing vascular access infections including culture and sensitivity guidelines were rarely followed. Moreover, the diagnosis and treatment of these infections were mostly empirical. On the other hand, and prior to permanent vascular access creation the initial assessment and vascular mapping protocols were rarely followed, often leading to creation of arteriovenous fistulae with poor specifications. Once created, further access

surveillance and intervention guidelines were rarely implemented.

In most African countries renal services are predominantly inaccessible to the poor and those living in urban areas with rationing of dialysis replacement therapy for the young and only those eligible for kidney transplant [12, 19]. According to most guidelines, maintenance HD should be delivered thrice weekly with a minimum total duration of 12 hours per week, unless supported by significant residual renal function [3, 4, 20]. A major limitation among our HD units was failure to comply with the proposed dialysis dose as most patients were on twice weekly HD. The delivered dose of dialysis is often measured in all our units using the urea reduction ratio [10]. Due to financial constraints these adequacy measures were repeated less frequently than that recommended by adequacy guidelines, and with poor adherence to the strict post-HD blood sampling protocols.

Dialysis patients require adequate supply of iron and erythropoietin. Left untreated, the anemia of CKD can lead to increased patients' mortality and morbidity [21]. Moderate deviations were seen in the implementation of the anemia of CKD guidelines among our HD patients. These included the late initiation of the anemia work-up, together with the infrequent testing and monitoring of the body iron status. These deviations had often led to delayed dose adjustments of both iron and erythropoietin, and accordingly poor achievement of the target goals

by most units [22]. It is worth mentioning that iron and erythropoietin therapy are not supplemented by the HD units and has to be brought by patients; accordingly, and due to financial constraints these medications were mostly available on interrupted basis.

Protein- energy malnutrition is common among patients on maintenance dialysis therapy, seen in 18% to 70%. It remains an essential predictor of patients' morbidity and mortality [23]. Most of the studied HD units in Khartoum State showed extreme deviations from the proper nutritional practice patterns, including the early nutritional assessment and thus early detection of abnormalities. The diet specialists available in most units were often non-renal-specialized dieticians, they require improvements regarding patients' counselling and updating about the appropriate dietary needs for HD patients. Most centers lacked regular counselling sessions and regular patients' follow-up. Dieticians' advice was solely given to the newly diagnosed ESRD patients. One of the four units evaluated had no dietician, accordingly lacking proper counselling sessions and nutritional assessment for patients.

Hemodialysis patients are considered to be at high risk for developing cardiovascular diseases [24]. Data suggest that uremic factors as well as those related to renal replacement therapy may be implicated in the pathogenesis of heart disease. It is known that cardiovascular survival tends to improve following kidney transplants, even in high-risk patients [25]. The United States Renal Data System reported cardiovascular causes as the single most common cause of death among HD patients [26, 27]. Assessment of cardiovascular risk factors remains a major goal to achieve within the HD best clinical practice guidelines. Our HD units showed major pitfalls regarding adherence to guidelines. These were mostly reflected as the irregular monitoring of serum calcium and phosphorus, poor surveillance of parathyroid hormone levels and the absence of echocardiographic follow-up.

Standard precautions with additional measures are recommended for dialysis units to prevent transmission of hepatitis B and C viruses from patient to patient [28]. On assessing HD units' adherence to hepatitis viruses infection control strategies, two of our units showed 100% consistency with the set guidelines. Units that failed to comply with the evidence-based practice patterns were mostly not performing follow-up screening for

hepatitis C virus and were having some gaps regarding implementation of the hepatitis B virus vaccination protocols.

Looking into individual dialysis units, Dr. Selma Dialysis Unit showed mild to moderate deviations from the modified evidence-based clinical practice guidelines; whereas OTH Dialysis Unit was classified as being predominantly non-adherent or showing extreme deviations from most guidelines. Dr. Selma Dialysis Unit superior performance was related to the better financial support provided, presence of a resident vascular surgeon together with the high experience, superior level of training and competence of the attending staff.

Conclusion

In Sudan a tremendous work had been done to provide free dialysis for all eligible patients. This policy had been hindered by the expanding patient pool and limited financial resources, often leading to lesser quality HD services. More campaigns are required to raise the awareness on clinical practice guidelines and their importance in our HD units. Performing regular guidelines audits of the key aspects of HD practice patterns is strongly recommended.

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