Effect of Isolation and Infection Control Measures on Seroconversion to Hepatitis "C" Among Hemodialysis Patients

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا

سُبْحَانَكَ لَا عِلْمَ لَنَا
إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

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Ahmed Saad

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List of Abbreviations

Abb.	Full term
CDC	Centers for Disease Control
CKD	Chronic Kidney Disease
DOPPS	Dialysis Outcomes and Practice Patterns Study
ESRD	End-Stage Renal Disease
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HD	Hemodialysis
HDF	Hemodialysis Facility
HDU	Hemodialysis Unit
IR	Incidence Rate
KDIGO	Kidney Disease: Improving Global Outcomes
KT	Kidney transplantation
PD	Peritoneal dialysis
SVRs	Sustained viral responses

ABSTRACT

Effect of isolation and infection control measures on seroconversion to Hepatitis"C"among hemodialysis patients

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Ahmed Saad El-Din

Egypt unfortunately has the highest hepatitis C virus (HCV) prevalence level in the world, estimated nationally at 14.7%. HCV prevalence among hemodialysis (HD) dialysis patients is ranging between 50-90% *(Mohamoud et al., 2013).* There is extensive variation in the HCV infection prevalence among different HD units in same country and among countries themselves, however, Egypt have unfortunately the worst record worldwide.

Despite the advent of screening of blood products for anti-hepatitis C virus (HCV) and using erythropoietin for treatment of anemia, the incidence of HCV seroconversion infection among HD patients is yet serious worrisome issue in hemodialysis units (HDU). The exact mode of HCV transmission within HD units is yet incompletely defined. HCV seroconversion in HD units is attributed to several risk factors. This thesis study is dedicatedly designed to study the effectiveness of isolation measures and infection control measures to prevent HCV seroconversion infection in HD units. The study was carried out in two HD units having one hundred and fifty one seronegative patients subjected to this study for 1 year. The results of this study have underscored the utmost importance of strict adherence to the universal / standard infection control measures and adoption isolation strategy for HCV positive patients.

This study suggests for efficient control of HCV seroconversion in HD units that having high HCV prevalence, inadequate staffing and suffering from break in infection control procedures; to implement regular testing of all patients for HCV-RNA, comprehensive isolation of positive HCV patients in separate room or partial isolation by using designated machines, equipment and staff for their dialysis depending on resources availability. However, strict adherence to the universal / standard infection control measure should remain without any compromise the utmost effective preventive method to control HCV seroconversion in HD units.

INTRODUCTION

Background

Egypt unfortunately has the highest hepatitis C virus (HCV) prevalence level in the world, estimated nationally at 14.7%. HCV incidence ranged from 0.8 to 6.8 per 1, 000 person-years. Overall, HCV prevalence among pregnant women ranged between 5-15%, among blood donors between 5-25%, and among other general population groups between 0-40%. HCV prevalence among multi-transfused patients ranged between 10-55%, among HD patients between 50-90%, and among other high risk populations between 10% and 85%. Statistical trend analysis suggests that there is no evidence of a statistical significant decline in HCV prevalence over time in neither general population nor high risk population *(Mohamoud et al., 2013).*

Hepatitis C virus (HCV) infection is an insistent public health concern in HD patients *(Alter et al., 2001).* HD patients are defenceless to HCV infection due to the risky exposure to HCV through the dialysis procedure. In contrast with the hepatitis B virus (HBV), there is no vaccine available for HCV. Moreover, the accurate testing for HCV is complicated because of regional variation in the HCV genome and the variation in screening tests. Unfortunately, HCV infected patients have insignificant clinical disease evidence. Further, HCV infection

in end-stage renal disease (ESRD) patients and patients receive a renal transplant are associated with greater morbidity and mortality *(Almroth et al., 2002).*

Infection control measures have been developed to reduce risk for HCV transmission in HD units. These measures include protocols for handling body fluids, isolation policies, and use of erythropoietin to minimize blood transfusions. However, HCV persists within HD units; there is variation in HCV prevalence and seroconversion rates between HD units. Differences in patient behaviour and community exposures such as intravenous drug abuse contribute to perseverance of HCV in HD units and also to variation in HCV prevalence and seroconversion among units. It is proven that facility-level practice patterns affect HCV transmission in dialysis units *(Hinrichsen et al., 2002).*

Hepatitis C virus (HCV) infection is a significant cause of morbidity and mortality in HD patients. The length of time on HD is widely believed to be associated with HCV acquisition in HD subjects *(Rahnavardi et al., 2008).*

Risk factors leading to HCV seroconversion infection among dialysis patients have been identified but not limited to number of blood transfusions, the duration of dialysis, the mode of dialysis, and the prevalence of HCV infection in the dialysis unit *(Marinaki et al., 2015).*

A more important risk factor contributing to the high prevalence of anti-HCV, particularly in the developing countries, could be the non-adherence to the known universal infection control precautions *(Huraib, 2003).*

The factors that might help reduce and/or prevent the spread of HCV infection among patients on dialysis include: early screening of patients for anti-HCV, reduction of the number of blood transfusions given, strict application of universal infection control precautions as recommended by Centers for Disease Control (CDC) and isolation of patients or machines which ever feasible *(Huraib, 2003).*

All HD facilities should establish a policy for screening patients for anti-HCV. Screening should occur on facility admission and subsequently on a semiannual basis. The intent of this practice is to establish each patient's baseline anti-HCV status (i.e., at the time of first entry to the facility), and by routinely comparing susceptible patients' baseline status to the results of their semiannual HCV screening, help providers to identify if an HCV seroconversion (i.e., a new HCV infection) occurs. Because infected patients often lack symptoms, timely testing and careful review of results are critical to identifying new HCV infections *(Nguyen et al., 2016).*

AIM OF THE STUDY

Is to evaluate the effect of isolation and infection control measures on seroconversion of Hepatitis "C" among HD patients.

Chapter 1
HEPATITIS C VIRUS AND HAEMODIALYSIS

Hepatitis C virus (HCV) was first identified in 1989. It is an enveloped RNA virus in the Flaviviridae family with a narrow host range (humans and chimpanzees).HCV is blood-borne and, based upon differences in molecular structure, a number of different strains (genotypes) have been described. The incubation period of acute hepatitis C is usually between 6 and 9 weeks. HCV infection may be acute or chronic. Acute hepatitis C is usually asymptomatic and often does not come to light until some years after infection. Hepatitis C is often diagnosed after routine blood testing, with the onset of hepatic impairment, or when screening a person at risk or a blood donor *(Jadoul & Barril, 2012).*

Hepatitis C virus infection has been reported to be the most common blood born pathogen all over the world *(Williams, 1999).*

In Egypt, infection with HCV has become the most important public health problem nowadays with the overall prevalence of anti-HCV in Egypt in 1993 was 13.6% *(Darwish et al., 1993).*

HD patients are at a high risk of infection by many blood borne pathogens. Some studies on HD patients in the United States reported an anti-HCV sero-prevalence of 20% in adults and 18.5% among children *(Pereira & Levey, 1997).*

However a higher prevalence was reported from Egypt 70–80% *(Soliman & Abd Elaziz 2012).*

The prevalence of HCV infection varies greatly among patients on HD from different geographic regions. In a review of data published in *1999, Wreghitt* described a range from 4% in the UK to 71% in Kuwait for HCV prevalence among the HD population *(Wreghitt, 1999).*

In Egypt, the prevalence of HCV antibodies in HD patients was found to be ranging from 52.3 to 82.3% *(Hassan & Khalil, 2000).*

Several studies have reported nosocomial patient-to-patient transmission of HCV infection among HD patients *(Schneeberger et al., 2000).*

Jadoul & Barril (2012) explained HCV methods of transmission as follow:

Drug misuse:

Injecting drug use remains the single most important reported risk factor for acquiring hepatitis C infection.