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Hepatitis B and C Viruses Infections among Dialysis Patients in Saudi Arabia

Badr Aljarallah*

Department of Hepatology and Gastroenterology division, Qassim University medical city, Qassim, Saudi Arabia

***Correspondence to:** Badr Aljarallah, Department of Hepatology and Gastroenterology division, Qassim University medical city, Qassim, Saudi Arabia, Tel no: 966593530543; E-mail: dr.nedalhabiba@gmail.com

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Abstract

Background

Viral Hepatitis is a global disease, affecting millions of patients around the world. Dialysis dependent patients used as an artificial kidney (hemodialyzer) to remove waste product from the blood in severe renal impairment patients. Hence they are more vulnerable to viral hepatitis.

Aims

The aim of this study is to investigate the prevalence of hepatitis B and C infections among dialysis patients in the Qassim province, Saudi Arabia. We further examine their epidemiological profile, risk factors, prognostic factors, treatment course, and characterization of their liver disease stage.

Methods

This study is a cross-sectional study. Hepatitis B and C positive patients receiving dialysis in Qassim Province were included in this study. We reviewed the data registry of dialysis centers where medical records of hepatitis B surface antigen (HBsAg) and hepatitis C virus (HCV) serology are reported from 18 affiliated dialysis centers across Al Qassim Region. The prevalence was calculated by dividing the number of patients with positive HBsAg or HCV serology to the total number of patients.

Results

The prevalence of Hepatitis B Surfaces Antigen (HBsAg) positive cases among in-center hemodialysis patients was 20 (03.2%) with 12 (01.9%) of cases converting from HBsAg negative to positive during the previous 12 months. While the prevalence of Hepatitis C antibody positive cases was 40 (06.4%) with 2 cases converting from negative to positive during the previous 12 months.

Conclusion

This study finds low intermediate prevalence HBV and high prevalence for HCV according to CDC classification.

Keywords : Hepatitis B virus; Hepatitis C virus; Haemodialysis; Infection

Background

Hepatitis B and hepatitis C are global infectious diseases of the liver. The pathological consequences of Hepatitis B Virus (HBV) infections include both acute and chronic disease. The manifestations of acute phase range from anicteric hepatitis to icteric hepatitis and in some cases, fulminant hepatitis. The manifestations of the chronic phase range from asymptomatic chronic carrier state to chronic hepatic insufficiency, cirrhosis, and hepatocellular carcinoma (HCC). The World Health Organization (WHO) revealed that more than 2,000 million people alive today have been infected with HBV at some time in their lives. Of these, about 350 million remain infected chronically and become carriers of the virus. About 5% of all populations are chronic carriers of HBV, and nearly 25% of all carriers develop serious liver diseases such as chronic hepatitis, cirrhosis, and primary hepatocellular carcinoma. HBV infections cause more than one million deaths every year.1 HBV is endemic in Saudi Arabia. The prevalence of HBV infection has declined considerably since the introduction of the HBV vaccine in the national immunization program in 1989. However, different reports have shown that HBV infections continue to be a major burden on the Saudi healthcare system. According to Algarni et al., 23,236 cases of HBV infections have been reported to the Saudi Ministry of Health during the 5-year period from 2009 to 2013 and the incidence rates were 19.3 and 14.7 per 100,000 in 2009 and 2013, respectively.2

An acute HCV infection is usually asymptomatic, and is only very rarely associated with life-threatening disease. About 15–45% of infected individuals spontaneously clear the virus within 6 months of infection without treatment. The remaining 55–85% develop chronic HCV infections. Of those with chronic HCV infections, the risk of liver cirrhosis is 15–30% within 20 years.3 The WHO estimates 437,292 HCV infections among persons living in the Kingdom of Saudi Arabia (KSA), based on an estimated prevalence of about 1.8%. 4

The WHO defines end-stage kidney disease (ESKD by the requirement for life-saving dialysis or kidney transplantation. Worldwide, the number of patients receiving renal replacement therapy (RRT) is estimated at more than 1.4 million, with the incidence growing by approximately 8% annually.5 The Saudi Center for Organ Transplantation's 2014 statistics showed a total of 15,782 dialysis patients, 14,366 of them are treated by Hemodialysis and the remaining 1,416 by peritoneal dialysis.6

There is a wide range in the prevalence of HBV and HCV infections among dialysis patients worldwide. In Saudi Arabia, many reports from different parts of the country showed a prevalence of HBV ranging from 1.5% to 75.7%.2,7-14 In a recent review article, it was reported that the prevalence rate was 14% for hepatitis B positive persons. Their table showed the previous reports of HCV in dialysis

patients in Saudi Arabia which range from 3.5% - 15%.6 The only study from the Qassim province was twenty years ago and showed a prevalence of 50% for the 96 included patients. No follow up studies were conducted in the province to assess the prevalence of HBV and HCV infections among dialysis patients.15 In a more recent report, the incidence HCV positive patients dropped to 7%.7

In other countries, the incidence of HCV varies widely, from 23.7% and up to 41% in Sudan and Tunisia respectively. 16-17 While in northern Europe the prevalence rate of HCV is less than 5% and in the United States around 10%.18

The commonest causes of renal failure in Saudi Arabia are hypertension and diabetes mellitus. Many studies are conducted globally to assess the prevalence and risk factors of blood borne hepatitis viral infections in dialysis patients. The last study from Saudi Arabia was in 2015. And the only study from Qassim was in 1996, no follow up study was done in Qassim province to determine the prevalence of HBV and HCV infections among dialysis patients. 15

Method

We reviewed the data registry of dialysis centers where medical records of monthly hepatitis B Surfaces Antigen (HBsAg) and hepatitis C virus (HCV) serology were reported from 18 affiliated dialysis centers across Al Qassim Region. All dialysis patients between August 2017 and August 2018 were included in the study. The prevalence was calculated by dividing the number of patients with positive HBsAg or HCV serology to the total number of in-center hemodialysis patients.

Data Management

Microsoft Excel had been used to tabulate the data being collected in this study which had been coded into numerical form for the purpose of data analyses. It was then cleaned and verified with questionable data had been validated and be excluded whenever necessary.

Data Security

Data had been stored in a password protected laptop or desktop that can only be accessed by the research team to ensure patients confidentially for studies and data. A hard copy of the Code and identification variable will be maintained in a locked file cabinet.

Statistical Analysis

The analysis was performed using Statistical Packages for Social Sciences (SPSS) version 20. Descriptive analysis has been conducted where numbers and percentages were used to summarize all categorical variables.

Results

The study included information form 18 dialysis centers, presented in Table 1. The majority of centers were government entities (77.8%) and the rest were for profit centers. Of the 18 centers, 10 (55.6%) were hospital based, 5 (27.8%) were freestanding and 3 (16.7%) were freestanding, but owned by a hospital. Nearly all dialysis centers were in-center daytime hemodialysis (94.4%). The range of in-center hemodialysis stations was 0 to 48 with a total of 205. All head nurses perform patient care in the dialysis center, while 16 (88.9%) of centers had an infection center at the same time. The majority of nursing staff (72.2%) were dialysis nurses or nurse managers, followed by hospital-affiliated or other infection control practitioner (66.7%). Dialysis center administrators or directors comprised (22.2%). Of the 18 centers, only (11.1%) of them stated that there was a dedicated vascular access nurse coordinator at the center. All the centers followed the same hygienic standard protocol from the ministry of health, including yearly HbsAg and HCVab testing.

Table 1: General information of Dialysis Center

Parameters	**N (%) (n=18)**
Dialysis Center	
Government	14 (77.8%)
For profit	04 (22.2%)
Hospital affiliation of dialysis center	
Freestanding	05 (27.8%)
Hospital based	10 (55.6%)
Freestanding but owned by a hospital	03 (16.7%)
Types of dialysis services center offered	
In-center daytime hemodialysis	17 (94.4%)
Home dialysis	01 (05.6%)
Number of in-center hemodialysis stations (Total)	205
Median (min – max)	6 (0 – 48)
Is there someone at your dialysis center in charge of infection center?	
Yes	16 (88.9%)
No	02 (11.1%)
If yes, which best describe this person †	
Dialysis nurse or nurse manager	13 (72.2%)
Hospital-affiliated or other infection control practitioner comes to our unit	12 (66.7%)
Dialysis center administrator or director	04 (22.2%)
Dialysis education specialist	02 (11.1%)
Patient care technician	02 (11.1%)
Other	01 (05.6%)
Is there a dedicated vascular access nurse/coordinator at your center?	
Yes	02 (11.1%)
No	16 (88.9%)

† Variable with multiple responses.

When asked about hepatitis B isolation capabilities, 83.3% stated they had hepatitis B isolation rooms, 1 respondent said they had a hepatitis B isolation area, and 2 of them said that they do not have hepatitis B isolation capabilities. Concerning routine isolation, a majority reported that patients with hepatitis C patients were routinely isolated (88.9%), followed by TB disease (72.2%), next were microorganisms such as VRE (61.1%), C. diff. (61.1%) and MRSA (72.2%). Seven of the centers reported routine TB infection screening upon admission.

Nearly all the centers (94.4%) maintained records of the station where each patient received their hemodialysis treatment for every treatment session, while 83.3% of them maintained records of the machine used for each patient's hemodialysis treatment for every treatment session. The majority of centers were able to determine if a bloodstream infection contributed to their hospital admission and were able to obtain a patient's microbiology lab records from hospitalization (Table 2).

Table 2: Isolation and screening

Statement	**N (%) (n=18)**
Does your center have capacity to isolate patients with hepatitis B	
Yes, use hepatitis B isolation room	15 (83.3%)
Yes, use hepatitis B isolation area	01 (05.6%)
No hepatitis B isolation	02 (11.1%)
Is patients' routine isolated or cohorted for treatment within your center for any of the following condition? †	
Hepatitis C	16 (88.9%)
Active Tuberculosis (TB disease)	13 (72.2%)
Methicillin-resistant Staphylococcus aureus (MRSA)	13 (72.2%)
Vancomycin-resistant Enterococcus (VRE)	11 (61.1%)
Clostridium difficile (C. diff.)	11 (61.1%)
None	02 (11.1%)
Other	12 (66.7%)
Does your center routinely screen patients for latent tuberculosis infection (LTBI) on admission to your center?	
Yes	07 (38.9%
No	11 (61.1%)
Patient Records	
Does your center maintain records of the station where each patient received their haemodialysis treatment for every treatment session?	
Yes	17 (94.4%)
No	01 (05.6%)
Does your center maintain records of the machine used for each patient's haemodialysis treatment for every treatment session?	
Yes	15 (83.3%)
No	03 (16.7%)
If a patient from your center was hospitalized, how often is your center able to determine if a bloodstream infection contributed to their hospital admission?	
Always	07 (38.9%)
Often	02 (11.1%)
Sometimes	03 (16.7%)
Rarely	03 (16.7%)
Never	02 (11.1%)
N/A	01 (05.6%)
How often is your center able to obtain a patient's microbiology lab records from hospitalization?	
Always	11 (61.1%)
Often	02 (11.1%)
Sometimes	02 (11.1%)
Rarely	02 (11.1%)
N/A	01 (05.6%)

† Variable with multiple responses.

A total of 707 non-transient dialysis patients were admitted with (88.1%) of patients receiving in-center hemodialysis and 2 patients admitted for peritoneal dialysis. Of those 707 patients, 237 patient care staff had been assigned consisting of (48.1%) nurses, (18.6%) staff physicians, (15.6%) dialysis patient-care technicians, (05.5%) social workers, (02.5%) dialysis biomedical technicians and a dietitian. Of the 707 patients, (69.0%) received at least 3 doses of the hepatitis B vaccine, (89.3%) received the influenza (flu) vaccine, and (42.3%) received at least one dose of the pneumococcal vaccine. Among 623 in-center hemodialysis patients, (76.9%) received at least 3 doses of the hepatitis B vaccine, (94.9%) received the influenza (flu) vaccine and (34.7%) received at least one dose of the pneumococcal vaccine. Of the 237 patient care staff, (80.2%) received at least 3 doses of the hepatitis B vaccine, and (71.7%) received the influenza vaccine. The prevalence of positive HBsAg among in-center hemodialysis patients was found to be (03.2%), (02.1%) were already positive when first admitted to the center, and (01.9%) were converted from HBsAg negative to positive during the previous 12 months. The prevalence of positive hepatitis C antibody (ELISA based testing) was (06.4), with (06.0%) of them being positive when first admitted to the center. Two

cases converted from negative to positive during the previous 12 months. There were 3 cases tested with HCVab, 8 cases found to have negative PCR, and 45 patients with no PCR available. Among 623 in-center hemodialysis patients, (77.8%) received AV fistula, (33.2%) received tunnelled central line, (05.1%) received AV graft and (03.5%) received non-tunnelled central line (Table 3).

Table 3: Patient, staff census, vaccine and Hepatitis B and C

Statement	Total Cases
How much maintenance, non-transient dialysis patients were assigned?	707 (100%)
In center hemodialysis	623 (88.1%)
Peritoneal Dialysis	02 (0.002%)
How many patient care staff worked in your center?	237 (100%)
Nurse/Nurse Assistant	114 (48.1%)
Physician/Physician Assistant	44 (18.6%)
Dialysis patient-care technician	37 (15.6%)
Social worker	13 (05.5%)
Dietitian	13 (05.5%)
Dialysis biomedical technician	06 (02.5%)
Vaccines	
Of the dialysis counted, how many received:	
At least 3 doses of hepatitis B vaccine	488 (69.0%)
The influenza (flu) vaccine for the current/most recent flu season	631 (89.3%)
At least one dose of pneumococcal vaccine	299 (42.3%)
Of the in-center hemodialysis patients counted, how many received:	
At least 3 doses of hepatitis B vaccine	479 (76.9%)
The influenza (flu) vaccine for the current/most recent flu season	591 (94.9%)
At least one dose of pneumococcal vaccine	216 (34.7%)
Of the patient care staff members counted, how many received?	
At least 3 doses of hepatitis B vaccine	190 (80.2%)
The influenza (flu) vaccine for the current/most recent flu season	170 (71.7%)
Of the maintenance, non-transient in-center hemodialysis patients:	
How many was hepatitis B Surfaces Antigen (HBsAg) positive? †	20 (03.2%)
Of these patients who were hepatitis B surface Antigen (HBsAg) positive, how many were positive when first admitted to your center?	13 (02.1%)
How many patients converted from hepatitis B Surface Antigen (HBsAg) negative to positive during the prior 12 months?	12 (01.9%)
Of the maintenance, non-transient in-center hemodialysis patients counted:	
How many was hepatitis C antibody positive? ‡	40 (06.4%)
Of these patients who were hepatitis C antibody positive, how many were positive when first admitted to your center?	38 (06.0%)
Patients converted from HC antibody negative to positive during the prior 12 months?	02 (0.003%)
HCV test	
HCVab	03 (05.4%)
PCR negative	08 (14.3%)
No PCR available	45 (84.9%)
General Vascular Access Information	
Of the maintenance, non-transient hemodialysis patients, how many received hemodialysis through each of the following access types?	
□ AV fistula	485 (77.8%)
Tunneled central line	207 (33.2%)
□ AV graft	32 (05.1%)
□ Non-tunneled central line	22 (03.5%)

Only 3 centers allowed nurses to administer vaccines without a specific physician order. All centers routinely screen hemodialysis patients for hepatitis C antibody upon admission. Seventeen centers tested their patients twice annually, and only 1 center conducted it annually. All centers did not use reused dialyzer for any patients. Twenty eight percent of centers used reverse osmosis (RO) test routinely to check the water from the reuse room for positive cultures and endotoxins whenever a reuse patient had a pyrogenic reaction. Out of 18 centers, 36.4% reported a limit to the number of times a dialyzer is used. Dialyzers were reprocessed at 20.0% of centers. Fifty percent of centers disclosed that dialyzer reprocessing occurs at an off-site facility, while 3 centers reported both off-site and at center. The majority of centers (60%) were equipped with automated dialyzer reprocessing equipment, while 40% of them used manual reprocessing. Conventional method use for dialysate was reported by most centers, while 27.8% of them used Ultrapure for dialysate. Fifteen centers routinely tested blood whenever a patient had a pyrogenic reaction, 10 centers tested the dialysate patients, and 13 centers test water. Eight centers (44.4%) said they used the hemodialysis machine's waste handling option, where all centers

indicated that their patients had no bleeding on the machine. Seven centers used a single-dose preparation of erythropoiesis stimulating agent (ESA), while 10 centers used a pre-packaged syringe. ESA or syringe administration to more than one patient was reported in 3 centers. Eleven centers stated that syringes were prepared in a separate room for patient administration, 4 centers reported a preparation process in a fixed location within the center grounds, 2 centers prepared syringes at the individual dialysis stations, and 1 center in a separate medication room. Seven centers administer IV medications and infusions to patients. The most commonly used saline flushes were the following: 8 centers used multi-dose saline vials, 5 centers drew saline from the patient's designated bag used for dialysis, 2 centers drew from a common saline bag used for all patients, and 1 center from patient's dialysis circuit. Six centers indicated they "always" administer antibiotics for a suspected bloodstream infection, four centers said they "often" administer antibiotics, three centers said "sometimes" and "rarely", and two said they "never" administer antibiotics. Seventeen of the centers participated in national or regional infection prevention related initiatives in the past year. All centers participated in hand hygiene campaigns, 12 centers campaigned to improve general infection control, ten centers on patients education/engagement for infection prevention, nine centers for bloodstream infection prevention, seven centers on catheter reduction and improvement of safety, and six centers for increase vaccination rates as well as improved use of antibiotics. Adherence to CDC guidelines was reported by 4 centers. All centers perform monthly hand hygiene audits for staff, whereas sixteen centers perform an annual staff competency assessment for vascular access care and catheter (Table 4).

Table 4: Dialysis Policies and Practices among dialysis patients

Statement	N (%) (n=18)
Vaccine and Hepatitis C	
Does your center use standing orders to allow nurses to administer any of the vaccines mentioned above to patients without a specific physician order?	
Yes	03 (16.7%)
No	15 (83.3%)
Does your center routinely screen hemodialysis patients for hepatitis C antibody at any other time?	
□ Twice annually	17 (94.4%)
□ Annually	01 (05.6%)
Dialyzer Reuse	
Does your center routinely test reverse osmosis (R.O.) water from the reuse room for culture and endotoxin whenever a reuse patient has a pyrogenic reaction? †	
□ Yes	04 (28.6%)
□ No	10 (71.4%)
Is there a limit to the number of times a dialyzer is used? †	
□ Yes	04 (36.4%)
□ No limit as long as dialyzer meets certain criteria	07 (38.9%)
Where are dialyzers reprocessed? †	
□ Dialyzers are reprocessed at our center only	02 (20.0%)
□ Dialyzers are transported to an off-site facility for reprocessing only	05 (50.0%)
□ Both at our center and off-site	03 (30.0%)
How is dialyzer reprocessed? †	
□ Automated reprocessing equipment	06 (60.0%)
□ Manual reprocessing	04 (40.0%)
Dialysate	
What type of dialysate is used for in-center hemodialysis patients at your center	
□ Conventional	13 (72.2%)
Ultrapure	05 (27.8%)
Does your center routinely test the following whenever a patient has pyrogenic reaction?	
Blood	
□ Yes	15 (83.3%)
□ No	03 (16.7%)
Dialysate from the patient's dialysis machine	
□ Yes	10 (55.6%)
□ No	08 (44.4%)
Water	
□ Yes	13 (72.2%)
□ No	05 (27.8%)
Priming Practices	
Does your center use hemodialysis machine Waste Handling Option (WHO)?	
□ Yes	08 (44.4%)
□ No	10 (55.6%)
Injection Practice	
What is the form of erythropoiesis stimulating agent (ESA) is most often used in your center?	
□ Single-dose vial	07 (38.9%)

□ Pre-packaged syringe	10 (55.6%)
□ N/A	01 (05.6%)
Is ESA from one single-dose vial or syringe administered to more than one patient?	
□ Yes	03 (16.7%)
□ No	15 (83.3%)
Where are medications most commonly drawn into syringes to prepare for patient administration?	
□ In a separate medication room	11 (61.1%)
At a fixed location within	04 (22.2%)
□ At the individual dialysis stations	02 (11.1%)
□ At a fixed location removed from the patient treatment area	01 (05.6%)
Do technicians administer an IV medications or infusates	
Yes	07 (38.9%)
No	11 (61.1%)
What form of saline flush is most commonly used?	
□ Flushes are drawn from multi-dose saline vials	08 (47.1%)
□ Flushes are drawn from the patient's designated saline bag used for dialysis	05 (29.4%)
□ Flushes are drawn from the patient's dialysis circuit	01 (05.9%)
□ Flushes are drawn from a common saline bag used for all patients	02 (11.8%)
□ Other	01 (05.9%)
In your center, how often are antibiotics administered for a suspected bloodstream infection before blood cultures are drawn?	
Always	06 (33.3%)
□ Often	04 (22.2%)
□ Sometimes	03 (16.7%)
Rarely	03 (16.7%)
□ Never	02 (11.1%)
Has your center participated in any national or regional infection prevention-related initiatives in the past year?	
□ Yes	17 (94.4%)
□ No	01 (05.6%)
If yes, what is the primary focus of the initiative(s)?	
□ Hand hygiene	18 (100%)
□ Improve general infection control	12 (66.7%)
□ Patient education/ engagement for infection prevention	10 (55.6%)
□ Bloodstream infection prevention	09 (50.0%)
□ Catheter reduction	07 (38.9%)
□ Improve culture of safety	07 (38.9%)
□ Increase vaccination rates	06 (33.3%)
□ Decrease/improve use of antibiotics	06 (33.3%)
Does your center follow CDC-recommended Core Intervention to prevent bloodstream infections in hemodialysis patients?	
□ Yes, all	01 (05.6%)
□ Yes, some	03 (16.7%)
□ No, none	14 (77.8%)
Prevention Activities	
Does your center perform staff competency assessments for vascular access care and catheter accessing annually?	
□ Yes	16 (88.9%)
□ No	02 (11.1%)

† Variable with missing cases which were excluded from the analysis.

Ten centers used alcohol-based hand rub to cleanse fistula or graft sites for rope-ladder cannulation, and 5 centers used soap and water. All centers used sodium hypochlorite solution, without alcohol or followed by alcohol, before rope-ladder cannulation of a fistula or graft. Nine centers used chlorhexidine with alcohol, 6 centers used chlorhexidine without alcohol, 5 centers used povidone-iodine, and 3 centers used alcohol. Ten centers used pre-packaged swabs and sponge sticks as antiseptic to prep fistula and graft sites, 5 centers used pre-packaged pads and 3 centers used a multiuse bottle. Three centers used buttonhole cannulation for all patients, another 3 used it for most of patients, and 3 centers stated that only some patients undergo buttonhole cannulation. where 13 of them were in-center hemodialysis patients only with one patient from home hemodialysis. At most centers, nurses performed buttonhole cannulation, but 2 centers reported patients performed buttonhole cannulation. Seven centers used chlorhexidine with alcohol at the buttonhole site before cannulation, 4 centers used chlorhexidine without alcohol, and 4 centers used povidone-iodine. Seven centers reported the routine use of antimicrobial ointment at buttonhole cannulation sites to prevent infection (Table 5).

Table 5: Vascular Access

Statement	N (%) (n=18)
Arteriovenous (AV) Fistulas or Grafts	
Before prepping the fistula or graft site for rope-ladder cannulation, what is the site most often cleansed with?	
Soap and water	05 (27.8%)
Alcohol-based hand rub	10 (55.6%)
Other	03 (16.7%)
Before rope-ladder cannulation of a fistula or graft, what is the site most often prepped †	
Sodium hypochlorite solution without alcohol	18 (100%)
Sodium hypochlorite solution followed by alcohol	18 (100%)
Chlorhexidine with alcohol	09 (50.0%)
Chlorhexidine without alcohol	06 (33.3%)
Povidone-iodine (or tincture of iodine)	05 (27.8%)
Alcohol	03 (16.7%)
What form of this skin antiseptic is used to prep fistula/graft sites?	
Multiuse bottle	03 (16.7%)
Pre-packaged swabs tick/sponges tick	10 (55.6%)
Pre-packaged pad	05 (27.8%)
How many of the fistula patients in your center undergo buttonhole cannulation?	
All	03 (16.7%)
Most	03 (16.7%)
Some	03 (16.7%)
None	09 (50.0%)
If any, which fistula patients undergo buttonhole cannulation? ‡	
In-center hemodialysis patients only	13 (92.9%)
Home hemodialysis patients only	01 (07.1%)
If any in-center hemodialysis patients undergo buttonhole cannulation, when buttonhole cannulation is performed for in-center hemodialysis patients, who most often perform it? ‡	
Nurse	15 (88.2%)
Patient (self-cannulation)	02 (11.8%)
Before cannulation, what is the buttonhole site most often prepped with?	
Chlorhexidine with alcohol	07 (38.9%)
Chlorhexidine without alcohol	04 (22.2%)
Povidone-iodine	04 (22.2%)
Other	03 (16.7%)
Is antimicrobial ointment routinely used at buttonhole cannulation sites to prevent infection?	
Yes	07 (38.9%)
No	11 (61.1%)

† Variable with multiple responses.

‡ Variable with missing cases which were excluded from the analysis.

The most common prep for catheter hubs in 9 centers was chlorhexidine with alcohol, followed by alcohol, and chlorhexidine without alcohol in 4 centers, and povidone-iodine in 1 center. All centers stated that the catheter hubs should be routinely scrubbed after the cap was removed. The most common prep for exit site for ten centers was chlorhexidine with alcohol, followed by povidone-iodine for five centers, with one center using alcohol and chlorhexidine without alcohol. Twelve centers used pre-packaged swab stick and sponge stick antiseptics at the exit site, 4 centers used pre-packaged pads instead, and 2 centers used multiuse bottles. All centers stated that nurses perform hemodialysis catheter care. Needleless closed connector devices on hemodialysis catheters were used by all centers; 17 for in-center hemodialysis patients, and 1 for home hemodialysis patients. Eight centers used chlorhexidine dressing for hemodialysis catheters, 4 centers used an antiseptic-impregnated catheter cap, 3 centers used antimicrobial-impregnated hemodialysis catheters, and one center used other antimicrobial dressings (Table 6).

Table 6: Hemodialysis Catheters

Statement	N (%) (n=18)
Before accessing the hemodialysis catheter, what is the catheter hubs most commonly prepped?	
Chlorhexidine with alcohol	09 (50.0%)
Alcohol	04 (22.2%)
Chlorhexidine without alcohol	04 (22.2%)
Povidone-iodine	01 (05.6%)
When the catheter addressing is changes, what is the exit site most commonly prepped with?	
Chlorhexidine with alcohol	10 (55.6%)
Povidone-iodine	05 (27.8%)
Alcohol	01 (05.6%)

Chlorhexidine without alcohol	01 (05.6%)
Other	01 (05.6%)
What form of this antiseptic/ disinfectant is used at the exit site? †	
Multiuse bottle	02 (11.1%)
Pre-package swabstic/spongestick	12 (66.7%)
Pre-package pad	04 (22.2%)
Are needleless closed connector devices used on hemodialysis catheters in your center?	
In-center hemodialysis patients only	17 (94.4%)
Home hemodialysis patients only	01 (05.6%)
Are any of the following used for hemodialysis catheters in your center? ‡	
Chlorhexidine dressing	08 (44.4%)
Antiseptic-impregnated catheter cap	04 (22.2%)
Antimicrobial-impregnated hemodialysis catheters	03 (16.7%)
Other antimicrobial dressing	01 (05.6%)

† Variable with missing cases which were excluded from the analysis.

‡ Variable with multiple responses.

Discussion

The data was obtained from eighteen centers across Al Qassim Region, Saudi Arabia where we reviewed data of non-transient dialysis patients between August 2017 and August 2018. The prevalence of positive HBsAg positive cases among in-center hemodialysis patients in this study was 3.2% (n=20). This result was lower than the paper published by Alkhan, where7 he reported that the prevalence of HBsAg positive hemodialysis patients in Saudi Arabia was 14%. Another published study from the Najran region demonstrated a 4.4% prevalence of positive HBsAg cases which is higher than the prevalence reported in our study.12 Globally, the prevalence of HBsAg positive cases has differed in accordance to the location. 18 – 27 In Iran, Roushan and his colleagues reported a very small percentage of HBsAg positive with 2.1% prevalence.18 On the contrary, Noori and associates reported a higher prevalence of 70.8%, which was the highest prevalence of HBsAg positive cases among national and international articles in the same subject.19 Regionally, Rached et al reported the least number of cases with HBsAg positivity with a prevalence of only 1.6% in Lebanon.20 In Brazil, the incidence of positive HBsAg cases among hemodialysis patients had seen a decline in recent years, from 4% in 2001 to 0.8% in 2014 – 2015.26 This study demonstrates the least prevalence of HBsAg positive patients among studies published in the same field.

The Incidence of Hepatitis C antibody positive is also common in hemodialysis patients. The prevalence of Hepatitis C antibody positive in this study was 40 (6.4%). We observed that this finding was the least number of cases reported in Saudi Arabia Al Khan, reported that among the hemodialysis patients, 7% were found to be Hepatitis C positive which was slightly higher than our study's findings.7 A high prevalence of Hepatitis C positivity is common among hemodialysis patients in Saudi Arabia.12, 28-31 Shaheen et al reported a relatively high prevalence with 72.3% which we perceived as the highest number of cases here in Saudi Arabia and abroad.28 In Najran, there were 12 HCV patients who were already positive before the HD-program and 30 cases of acquired HCV positivity during dialysis.12 In our report, 30 of the in-center hemodialysis patients were already HCV positive before the admission and an incidence of 2 cases converting from HCV negative to positive during the course of treatment was reported. Our study had incidences of positive HCV findings before admission that can be attributed to different factors such as blood borne viruses and non-human primates.32 Moreover, the incidence of Hepatitis C positive had also been reported in various regional and international articles.18–27 Cordiero et al, recorded the least number of cases of hepatitis C positive in Brazil with a prevalence of 2.8%, which was lower than the prevalence reported in our study.26 Several international papers also indicated a lower prevalence of HCV positive than the prevalence reported in our study. 18, 20, 23-25 In accordance with our results, Prakash et al reported similar incidence of HCV positive dialysis patients.23 On the other hand, different international articles elaborated the high prevalence of HCV positivity. 19, 21,22, 27 A study conducted in Indonesia showed the highest prevalence of Hepatitis C positive with 61%.26

Conclusion

The Incidence of hepatitis B and C positivity was common in patients receiving hemodialysis. This study finds low prevalence on both Hepatitis B and C positive as opposed to several published articles, both local and international. However, further studies are needed to generalize the outcome of this study.

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