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EVALUATING THE EFFECTIVENESS OF HEPATITIS AND HIV PREVENTION PRACTICES AMONG DIALYSIS PATIENTS

Zahid Ullah Khan[1], Haris Khan[2], Areeba Waheed[3], Areeba Khan[4], Muhammad Zohaib Qasim[5], Mushtaq Sarwar[6]

[1]Assistant Professor, Department of Emergency Medicine Department, MTI Lady Reading Hospital, Peshawar, Pakistan, Email: Zahid_kmc@yahoo.com

[2]House Office, Rehman Medical Institute, Peshawar, Pakistan, Email: drhariskhan@yahoo.com
ORCID: https://orcid.org/0009-0006-4901-7438

[3]MBBS Student, 5th year, Rehman Medical Institute, Peshawar, Pakistan
Email: Areebawaheed564@gmail.com, ORCID: https://orcid.org/0009-0006-7699-818X

[4]Department of Medical Laboratory Technology, University of Sialkot, Pakistan
Email: areebashahidkhan@gmail.com

[5]Medical Officer, Department of Internal Medicine, Civil Hospital, Bahawalpur, Pakistan
Email: zohaibqasim152@gmail.com

[6]Department of Zoology, Kohat University of Science and Technology, Kohat
Email: mushtaqsarwar892@gmail.com

Corresponding Author: Areeba Waheed, [3]MBBS Student, 5th year, Rehman Medical Institute, Peshawar, Pakistan, Email: Areebawaheed564@gmail.com,
ORCID: https://orcid.org/0009-0006-7699-818X

ABSTRACT

Background: Hepatitis B, Hepatitis C, and HIV infections are more likely to occur in patients with chronic kidney disease (CKD), who must get dialysis. Outbreaks and diseases continue despite preventative efforts, highlighting the need for efficient prevention techniques.

Objective: To evaluate the effectiveness of Hepatitis and HIV prevention practices in dialysis settings and identify gaps for evidence-based improvements.

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Methodology: This multicenter cross-sectional study was conducted between January and December 2023, utilizing data collected from various hospitals across Pakistan, including prominent medical institutions in Peshawar, Bahawalpur, Kohat, and Sialkot. The data collection methods comprised retrospective record reviews, direct observations, and structured interviews involving 218 dialysis patients and 50 healthcare providers. Statistical analysis was performed using SPSS software. Chi-square tests were employed to assess the relationships between infection rates, vaccination coverage, and infection control strategies, with statistical significance set at a p-value of less than 0.05.

Results: The study's p-values were above 0.05, indicating that there were no statistically significant correlations between infection rates and infection control measures (hand hygiene: 14.37%, p=0.15; sterilization protocols: 14.12%, p=0.16; patient isolation: 12.63%, p=0.10; universal precautions: 13.87%, p=0.12). Nonetheless, there were notable correlations between vaccination coverage and infection rates, with 8.89% for Hepatitis B (p=0.006) and 10.00% for Hepatitis C (p=0.005).

Conclusion: Hepatitis and HIV infections among dialysis patients were shown to be significantly decreased by vaccination coverage, but infection control strategies showed only patchy results. The results emphasize the need of focused actions aimed at raising immunization rates in order to strengthen efforts to avoid infections.

KEYWORDS: Chronic Kidney Disease, Dialysis, Hepatitis, HIV, Infection Prevention, Vaccination, Infection Control.

INTRODUCTION

Dialysis is required as a life-sustaining therapy for millions of people worldwide who suffer from chronic kidney disease (CKD), a global health problem [1]. However, since dialysis involves intrusive procedures, frequent blood transfusions, and continuous catheter usage, it is linked to an increased risk of infection [2]. HIV, Hepatitis B, and Hepatitis C are among the most serious illnesses that dialysis patients may get [3]. Effective preventative measures are critically needed since these illnesses not only raise death rates but also worsen the clinical burden [4].

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There are many ways that HIV and hepatitis might spread in dialysis settings, including tainted equipment, inadequate sterilizing procedures, and violations of accepted infection control guidelines [5]. Healthcare systems have put in place several preventative measures in recognition of these concerns, including regular screening, strict adherence to universal precautions, immunization, and patient isolation techniques [6]. Outbreaks and intermittent transmissions are still being reported despite these measures, indicating weaknesses in the present procedures and their implementation [7]. Furthermore, there are considerable regional and healthcare facility-specific variations in the incidence of HIV and Hepatitis among dialysis patients, which may be attributed to a variety of variables, including patient demographics, staff training, and resource availability [8]. There is potential for improvement and innovation in preventative measures since, whereas some studies have shown the effectiveness of certain treatments, other studies show inconsistent use of such programs. A thorough assessment of current procedures is necessary to address these issues to pinpoint areas for focused intervention as well as their advantages and disadvantages [9]. The intricacy of infection control in dialysis environments emphasizes the need for regular evaluations to guarantee conformity with changing recommendations and new data [10]. These assessments have a key role in reducing the risk of infection and raising the standard of care for dialysis patients overall [11]. This study looks at how well HIV and hepatitis prevention strategies are currently working in dialysis centers, offering a data-driven basis for improving infection control procedures.

Research Objective

To evaluate the effectiveness of existing Hepatitis and HIV prevention practices in dialysis settings, to identify gaps, and to recommend evidence-based improvements.

MATERIALS AND METHODS

Study Design and Setting

This multicenter cross-sectional study was conducted over one year, from January to December 2023, across several hospitals in Pakistan, including MTI Lady Reading Hospital (Peshawar), Rehman Medical Institute (Peshawar), Civil Hospital (Bahawalpur), DHQ Teaching Hospital (Kohat), Syed Medical Complex, and Sialkot Medical Complex (Sialkot).

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Inclusion and Exclusion Criteria

Adult patients (≥18 years) receiving hemodialysis for at least three months throughout the study period met the inclusion requirements for this research. Also included were medical personnel who performed dialysis directly. Patients with incomplete medical records, dialysis patients getting care outside of the hospital throughout the research period, and temporary or visiting dialysis professionals who were not regularly involved in the unit's procedures were also excluded.

Sample Size

Convenient sampling was used to establish the sample size because of the hospital's accessible population. Given the frequency of HIV and hepatitis infections in dialysis settings and the facility's capability, the research included a total of 218 patients and 50 healthcare professionals, guaranteeing adequate representation from the dialysis unit.

Infection Rate (%) = (Total Infections × Compliance (%) / Total Patients)×100

Total Infections: sum of infections

Compliance (%): Compliance rates

Total Patients: Total dialysis patients from the study.

Data Collection

Structured interviews with healthcare personnel, direct observations, and retrospective record checks were all used to gather data. The frequency of Hepatitis B and C vaccinations among patients, the incidence of Hepatitis and HIV infections, staff training frequency, and adherence to universal precautions were among the key variables evaluated. Other factors included compliance with infection control measures (e.g., hand hygiene, sterilization protocols, and patient isolation). While observational checklists were used to track infection control procedures in real time, patient records were examined to assess infection rates and vaccination statuses. Staff perspectives and difficulties with preventative strategies were elicited via structured interviews.

Statistical Analysis

SPSS software (version 26) was used to analyze the data. While inferential statistics like chi-square and logistic regression evaluated relationships between infection rates and preventative measures,

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descriptive statistics provided an overview of clinical and demographic features. P-values less than 0.05 were regarded as statistically significant.

Ethical Approval

The Institutional Review Boards granted ethical clearance for the research before any data was collected. All participants gave their informed agreement, guaranteeing their privacy and voluntary involvement in the research.

RESULTS

The clinical and demographic features of dialysis patients are shown in Table 1. Patients between the ages of 30 and 50 made up 38.99% of the total, with those over 50 making up 42.66%. The patient population was composed of 44.96% females and 55.04% men. Most patients (43.59%) had been receiving dialysis for 12–24 months. According to vaccination statistics, 61.92% of people had received the Hepatitis B vaccine, and 64.22% had received the Hepatitis C vaccine. While 8.26% of individuals tested positive for HIV, the majority (91.74%) tested negative.

Table 1: Demographic and Clinical Characteristics of Dialysis Patients

Variable	Category	Number of Patients (n;%)
Age (years)	<30	40 (18.34%)
	30–50	85 (38.99%)
	>50	93 (42.66%)
Gender	Male	120 (55.04%)
	Female	98 (44.96%)
Duration of Dialysis (months)	<12	75 (34.40%)
	12–24	95 (43.59%)
	>24	48 (22.01%)
Vaccination Status	Hepatitis B Completed	135 (61.92%)
	Hepatitis C Completed	140 (64.22%)
HIV Status	Negative	200 (91.74%)
	Positive	18 (8.26%)

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The rates of infection control measure compliance among healthcare professionals in dialysis settings are shown in Figure 1. The greatest compliance rate was 87.00% for hand hygiene, 85.50% for sterilizing procedures, 84.00% for universal precautions teaching, and 76.50% for patient isolation. These findings show that different dialysis patients adhere to infection control procedures, which are essential for limiting the spread of diseases like HIV and hepatitis.

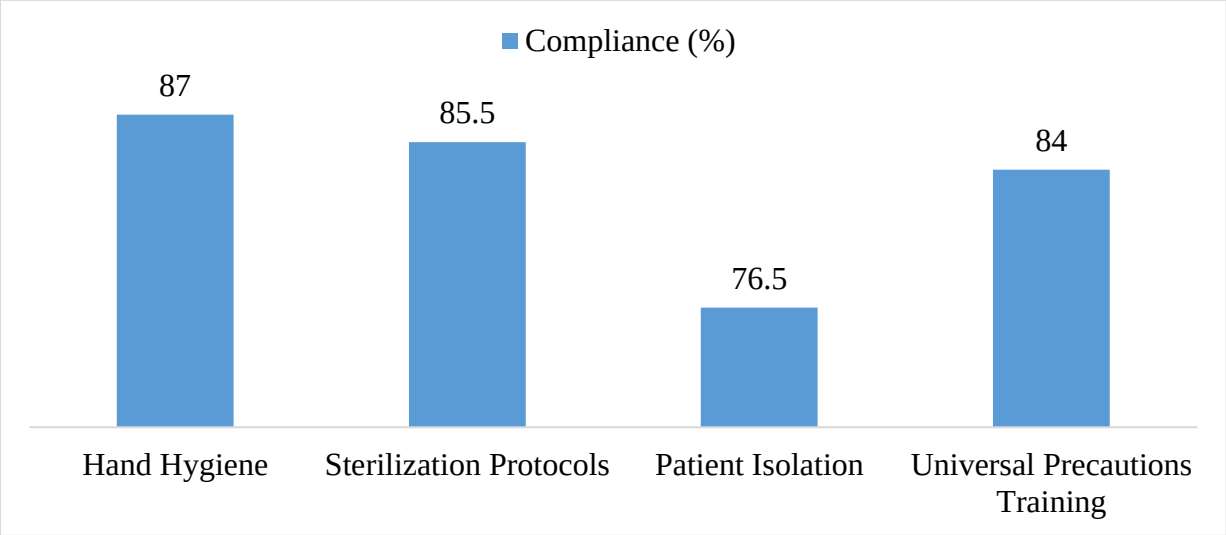

Figure 1: Compliance with Infection Control Measures among Healthcare Providers

The prevalence of HIV and hepatitis infections in dialysis patients is shown in Figure 2. The following are the number of infections and the associated incidence rates: HIV (ten infections, 4.58%), Hepatitis B (12 infections, 5.50%), and Hepatitis C (fourteen infections, 6.42%). These results demonstrate how common these infections are in dialysis environments.

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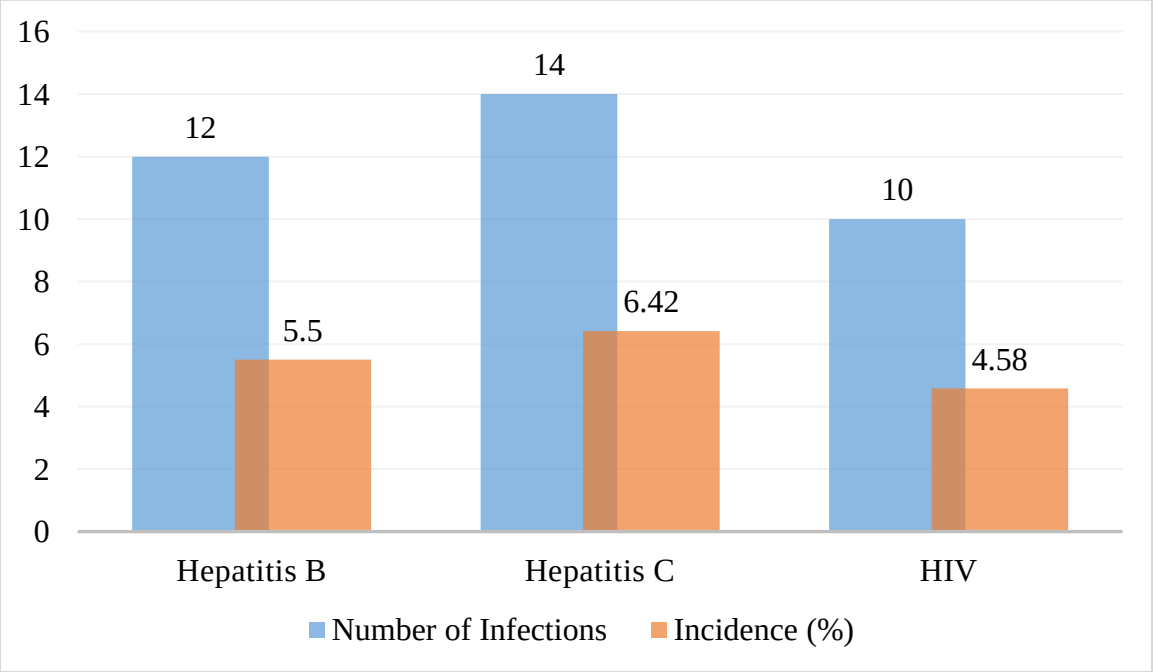

Figure 2: Incidence of Hepatitis and HIV Infections among Dialysis Patients

The relationship between infection management practices and infection rates in dialysis patients is shown in Table 2. Hand hygiene, sterilizing procedures, isolation of patients, and universal precautions had infection rates of 14.37%, 14.12%, 12.63%, and 13.87%, respectively. Since all of the p-values are over the 0.05 threshold, the equivalent p-values from the Chi-square tests are 0.15, 0.16, 0.10, and 0.12, suggesting that none of these infection control strategies show statistically significant relationships with HIV and hepatitis infection rates.

Table 2: Association between Infection Control Measures and Infection Rates

Infection Control Measure	**Infection Rate (%)**	**p-value (χ^2 test)**
Hand Hygiene	14.37%	0.15
Sterilization Protocols	14.12%	0.16
Patient Isolation	12.63%	0.10
Universal Precautions	13.87%	0.12

The association between dialysis patients' infection rates and vaccination coverage is seen in Table 3. Among patients who received vaccinations, the infection rates for Hepatitis B and

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Hepatitis C were 8.89% and 10.00%, respectively. There are statistically significant correlations between vaccination coverage and lower rates of infection for both Hepatitis B and Hepatitis C, according to the p-values from the Chi-square tests, which are 0.006 and 0.005.

Table 3: Vaccination Coverage and Infection Rates among Dialysis Patients

Vaccination Status	Infections (Number)	Total Patients Vaccinated (n)	Infection Rate (%)	p-value (χ^2 test)
Hepatitis B Vaccination	12	135	8.89%	0.006
Hepatitis C Vaccination	14	140	10.00%	0.005

DISCUSSION

The results of this research shed light on several significant issues regarding the efficacy of HIV and hepatitis prevention strategies among dialysis patients. A clear demographic profile is shown in Table 1, which reveals that the majority of patients were in the 30- to 50-year-old age range (38.99%) and that the majority had been receiving dialysis for 12 to 24 months (43.59%). With 61.92% of people having received the Hepatitis B vaccine and 64.22% having received the Hepatitis C vaccine, vaccination coverage for both diseases was quite high. According to earlier research, which found comparable vaccination coverage for Hepatitis B and Hepatitis C and underlined the significance of raising vaccination rates to strengthen infection control efforts in dialysis settings, this suggests moderate adherence to vaccination protocols, which has been demonstrated to play a critical role in lowering infection rates in dialysis patients [6,12].

Hand hygiene, sterilizing procedures, isolation of patients, and universal precautions had infection rates of 14.37%, 14.12%, 12.63%, and 13.87%, respectively. However, with p-values of 0.15, 0.16, 0.10, and 0.12 for HIV and Hepatitis, respectively, none of these infection control measures demonstrated statistically significant correlations with infection rates. These findings align with other studies that have emphasized the difficulties in attaining high adherence to infection control protocols in dialysis environments, resulting in uneven results [13,14].

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On the other hand, our research shows a strong correlation between infection rates and vaccine coverage. The infection rate for the Hepatitis B vaccine was 8.89% with a p-value of 0.006, while the infection rate for the Hepatitis C vaccination was 10.00% with a p-value of 0.005. These results are consistent with other research highlighting the protective function of immunization in avoiding HIV and Hepatitis infections in dialysis patients [15,16]. Our results were supported by a research by Grzegorzewska (2012), which found that vaccinated patients had considerably lower infection rates than non-vaccinated patients [17].

Our research adds to the mounting evidence that immunization is still a vital method for lowering HIV and hepatitis infections in dialysis patients, even while infection control measures are important. Improving infection prevention results in dialysis settings requires addressing compliance gaps and placing a strong emphasis on vaccine coverage.

Study Strength and Limitations

One of the study's many advantages is its thorough cross-sectional design, which made it possible to include a sizable sample of dialysis patients and medical professionals, guaranteeing accurate and broadly applicable findings. The accuracy of data collection was improved by the use of observational checklists, retrospective record reviews, and structured interviews. Furthermore, the statistical analysis using Chi-square testing yielded important information on the connections among infection rates, vaccination coverage, and infection control procedures. The research does, however, have many drawbacks, including the use of convenient sampling, which might lead to selection bias, and the possibility of recollection or reporting bias, especially when using self-reported data. Furthermore, since the research is cross-sectional and simply records a snapshot of behaviors without evaluating long-term results or the effects of treatments over time, it restricts the ability to draw conclusions about causality.

Conclusion

The limited effectiveness of infection control techniques such hand cleanliness, sterilization procedures, patient isolation, and universal precautions is highlighted by this research, which also emphasizes the significance of vaccination as a primary approach in lowering HIV and Hepatitis infections among dialysis patients. The results are consistent with other studies that highlight the need of focused treatments and enhanced adherence to preventative measures. Notwithstanding its

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merits, the study's shortcomings such as its cross-sectional design and selection bias—point to areas that need further investigation into the long-term efficacy of immunization and infection control measures in dialysis settings.

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