

**“STUDY OF THE DIALYSIS DEPARTMENT IN A TERTIARY
CARE TEACHING HOSPITAL WITH SPECIAL EMPHASIS ON
QUALITY OF DIALYSIS WITH RESPECT TO REVERSE
OSMOSIS TECHNOLOGY WATER AND ULTRAFILTRATE
TECHNOLOGY WATER”**



**SHRI
DHARMASTHALA
MANJUNATHESHWARA
UNIVERSITY**

Dr. Keerthesh R

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Post Graduate Student in the Department of Hospital Administration.
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Under the guidance of

Dr. Kiran Hegde.S

Prof & Head, Dept. of Hospital Administration
SDM College of Medical Sciences & Hospital
Manjushree Nagara, Sattur, Dharwad - 580009

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Shri Dharmasthala Manjunatheshwara University, Dharwad, Karnataka

1. ABSTRACT

1.1. Background

The present study was conducted in a 1250-bedded tertiary care teaching hospital in northern Karnataka, serving as a major referral centre. The central dialysis unit plays a critical role in managing patients with acute kidney injury (AKI) and chronic kidney disease (CKD), including end-stage kidney disease (ESKD) requiring maintenance haemodialysis. The quality and safety of haemodialysis depend upon infrastructure, staffing, workflow efficiency, infection control practices, and most importantly, the quality of dialysis water. With advancements in reverse osmosis (RO) and ultrapure ultrafiltration technologies, ensuring microbiological and endotoxin safety of water has become central to dialysis quality assurance. This study evaluates the structure and functioning of the dialysis unit with special emphasis on infection control and comparison between conventional RO and ultrapure water systems.

1.2. Objectives

1. To study the layout, infrastructure, staffing pattern, processes, and functioning of the dialysis unit.
2. To assess the quality of dialysis services with respect to infection control.
3. To evaluate ultrapure water technology in comparison with conventional RO technology in terms of service quality and economic viability.

1.3. Methodology

A descriptive, observational, retro-prospective study was conducted from July 2023 to March 2025 in the Central Dialysis Unit (28 beds) of the hospital's superspeciality building. Data were collected through direct observation, structured staff interviews, and review of hospital records including machine logs, infection surveillance data, and water quality reports. Parameters assessed included layout, staffing adequacy, workflow processes, scheduling, machine utilization, infection control practices, and water quality indicators. Findings were compared with BIS, ISN, KDIGO, AAMI, and ISO 23500:2019 standards.

1.4. Results

The dialysis unit demonstrated appropriate zoning with segregation of seropositive cases and streamlined workflow. A total of 31 functional machines were evaluated, with an overall utilization rate of 81.64%, reflecting efficient resource management. Infection control protocols, including machine disinfection and dialyzer reprocessing based on fiber bundle volume criteria, were consistently followed.

Ultrapure RO water monitoring showed endotoxin levels <0.0500 EU/mL, microbial counts maintained at 0.1 CFU/mL, TDS <5 ppm, and conductivity <10 µS/cm, all within recommended standards. Dialysate composition remained stable without significant inter-machine variation. Compared to conventional RO systems, ultrapure technology demonstrated superior microbiological safety and reduced endotoxin burden, with manageable incremental costs.

1.5. Conclusion

The dialysis unit exhibited well-structured infrastructure, effective infection control practices, and optimal machine utilization. Ultrapure RO water technology ensured enhanced microbiological safety, biochemical stability and long-term sustainability. Its integration represents a quality-enhancing and administratively feasible advancement in tertiary care dialysis services.

Keywords - Dialysis utilisation, dialysis workflow, infrastructure audit, Hemodialysis; Dialysis Unit Management; Reverse Osmosis (RO); Ultrapure Water; Ultrafiltration Technology; Dialysate Quality; Endotoxin Monitoring; Infection Control; Dialyzer Reprocessing; Machine Utilization; Water Quality Standards; AAMI/ISO 23500; Hospital Administration; Quality Assurance; Tertiary Care Teaching Hospital.