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Others Section

View Point

Roles and Responsibility of the Retriever Renalogist: An Insight

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Unequivocally, the term "retriever" is the pertinent description for the dialysis technologists since they consecrate themselves to retrieving the quality of life of the dialysis patients. These professionals commit their lives to their patients; they are so dedicated that even natural disasters can't derail their work. Apart from just assembling the extracorporeal circuit and terminating the case, technologists play a predominant role during renal replacement therapy.

HAEMODIALYSIS: ROLE AND RESPONSIBILITY

Dialysis Zone Infrastructure

The technologist is accountable for maintaining the facility in an aseptic environment with an ambient temperature of 70-72°F and a humidity of 55-60%. The area must be well-organised to curb patients from converting from negative to positive serology (sero-conversion). As a consequence, the spectrum is divided into negative and positive bays, and patients are dialysed in their respective bays based on their serology. The dialysis facility also features an emergency evacuation tunnel that connects to Intensive Care Unit (ICU) in case of a medical emergency [1].

Dialysis Zone Necessities in an Emergency

The defibrillator and the crash cart are required equipment components for the unit. These are crucial in circumstances where saving lives is vital. The oxygen cylinder or colour-coded oxygen supply pipelines, along with vacuum pump lines next to them, make up the other significant pieces of equipment.

Primitive Medical Care

Technologists render significant contributions to patient care through their knowledge and experience. These professionals supervise patients from the time they arrive at the facility until they depart. When a patient arrives at the department, their weight and vascular access are assessed. Technologists ought to be acquainted with sphygmomanometers, thermometers, and glucometers to evaluate blood pressure, temperature, and plasma glucose. In addition to these, they have the requisite skills to analyse vital indicators, including heart rate, respiration rate, pulse rate, and Electrocardiogram (ECG) waves. Typically, these parameters are detected in monitors with the use of leads positioned on the patient's skin [2].

Assessment of Vascular Access

The viability of the fistula is assessed by bruit or thrill sound, which benchmarks the patency of the access. The technologist also ensures if there is any lack of sensation to rule out the steal syndrome (ischaemia of the limb bearing a permanent access). The access is intended to be sterile during cannulation to prevent infection, and the ideal techniques are the rope ladder method with sharp needles and the buttonhole approach with blunt needles.

These professionals indeed have the responsibility of guiding and training patients to perform ball exercises for prominent matured veins. The therapist examines for inflammation at the exit site before scrubbing with a povidone-iodine solution in the case of temporary access. Medical professionals advise patients to take preventative measures and administer catheter antibiotics locks as per the nephrologist's orders when there is inflammation.

The permanent access is inaccessible for drawing blood and recording blood pressure. These safety measures are educated by the therapist. To improve the longevity of access, patients are recommended to undrape the tourniquet after 4 hours postdialysis. To prevent vascular complications such as stenosis or thrombosis, thrombolytic agents or ice pack application is suggested [3].

Intradialytic Roles

While the patient is on dialysis mode with the extracorporeal circuit intact with the machine circumference, the technologist monitors both the living and non living sectors of the dialysis. The sole purpose of monitoring the patient during dialysis is to avert intradialytic complications. The therapist's key role is to use sodium modeling and ultrafiltration profiling to reduce predominant complications such as hypotension and muscle cramps. Other vitals that are monitored include venous pressure, transmembrane pressure, and conductivity. These pressures indicate any complications, such as swelling at the cannulation site, dislocation of needles, clotting of the dialyser, and increased sodium and bicarbonate levels due to high conductivity. Air bubbles invading the circuit must be monitored meticulously as they can cause circuit clotting or an air embolism. If not addressed, it can jeopardise the situation and put the patient's life at stake. The therapist must be proactive during the procedure.

Haemodialysis Equipment

Dialyser-the artificial kidney: The dialyser, or artificial kidney, is the central component of the procedure. Professionals predetermine the dialyser based on the patient's body surface area. Ethylene trioxide (ETO) or steam is used for sterilising these dialysers. Since this sterilisation technique is perilous, a priming step is performed to prevent complications such as first-use syndrome or activation of the complementing system. After completing the step, a test factor helps in ruling out the presence of residual substances.

Storage and reuse of the dialyser: Dialysers are typically reprocessed and reused before being stored in an aseptic environment. Before storing and priming the dialyser, professionals ensure that the sterilising agents are atleast 90% full. They also provide specific details on each dialyser, such as the patient's name, age, and distinctive hospital Identification (ID) number. If the dialyser is stored for an extended period (more than a month), it is not reused.

Blood circuit: These circuits are sterilised using agents similar to those used for dialysers. Therefore, these agents must be removed before the procedure. After the priming process, technologists ensure that the circuit is free of contaminants by performing a litmus paper test. The volume of these circuits varies depending on the group of patients undergoing haemodialysis; adult circuits are typically around 150 mL, while paediatric circuits are 10% less.

Anticoagulant: Low molecular weight heparin is the preferred drug during haemodialysis to prevent blood clotting. The dosage of the drug is determined based on laboratory data of Partial Prothrombin Time (PTT) and clotting time. Technologists find it easy to prevent circuit clots during heparin-free dialysis. They also ensure that anticoagulants are avoided in cases of active bleeding or completed/ planned surgery.

Dialysate: The fluid part used during the procedure, known as the dialysate or bath, contains a specific concentration of electrolytes and an acid-base component [Table/Fig-1]. It interacts with the blood to aid diffusion. There are two types of buffer systems: acetate-based and bicarbonate-based. Each type has its advantages and disadvantages. Acetate dialysate is not ideal for patients with liver failure because acetate cannot be converted into bicarbonate.

Acid	Bicarbonate
Sodium- 84 mEq\L	Sodium- 54 mEq\L
Potassium- 2 mEq\L	Chloride- 19 mEq\L
Calcium- 3 mEq\L	Bicarbonate- 35 mEq\L
Magnesium- 0.75 mEq\L	Dialysate sodium- 138 mEq\L
Acetic acid- 4 mEq\L	Dialysate chloride- 109 mEq\L
Chloride- 90 mEq\L	Dialysate ratio- 1:1.83:34
Dextrose- 100 mg	

[Table/Fig-1]: Dialysate components and their concentrations.

The Reverse Osmosis (RO) standards for dialysate include a requirement of <100 μs/cm^3 colony forming units and endotoxin levels should be <0.03 μs/cm^3. It is important to remove trace metals as they can lead to toxicity [4].

For patients with hyperkalemia, potassium-free baths are highly recommended. There are several options available, including a zero-potassium bath, 2 K bath and 4 K bath [5].

The volumetric portable device facilitates the precise elimination of ultrafiltration volume from the patient's body. The ultrafiltration volume is determined by the difference between dry weight and prehaemodialysis weight. This advanced device also allows for online clearance monitoring of urea/sodium, as well as measurements of blood temperature and pressure. It is user-friendly, practical, and offers assistance in case of any issues.

Haemodialysis standards: Professionals adhere to haemodialysis standards to enhance the quality of life and prevent complications in haemodialysis patients. Regulatory bodies provide guidelines for determining the quality of dialysis, with the adequacy cut-off value typically set at 1.4-1.6 [6]. To achieve this goal, technologists must consider specific criteria for adequacy, such as dialyser surface area based on body surface area, cannulation technique to prevent recirculation, dialysis duration and frequency, effective blood flow rate, and dialysate flow rate.

Post haemodilaysis role: Technologists assess vital signs and the patency of vascular access. If the blood pressure exceeds 160/90 mmHg, they do not administer erythropoitein (EPO) [7]. They also educate the patient on vascular access maintenance and restrictions on salt and water intake. They evaluate the postdialysis weight to ensure accurate removal by the machine. If complications arise during subsequent dialysis sessions, they may reassess the dry weight.

PERITONEAL DIALYSIS: ROLES AND RESPONSIBILITIES

When it comes to peritoneal dialysis, it may seem like the technologist's role is simple and concise. However, it requires great care as the entire procedure is manual, and there are no pressure pods to monitor inflow and outflow pressure. Technologists follow aseptic procedures throughout the dialysis process to prevent the risk of developing peritonitis. In addition to manually conducting the procedure, technologists play a pivotal role in determining the type of transporter through Peritoneal Equilibration Test (PET). Non compliance with aseptic process increases the risk of peritonitis and may require the patient to transition to chronic haemodialysis. Therefore, the role may sound effortless, but it is not as easy as it may seem. The therapist primarily assesses the effectiveness of the dialysis, which helps improve the therapy. Furthermore, educating patients and caregivers on the aseptic process of manual exchange in peritoneal dialysis is one of the most crucial responsibilities.

CONTINUOUS RENAL REPLACEMENT THERAPY: ROLES AND RESPONSIBILITIES

The technologist plays a crucial role in continuous renal replacement therapy, which is often indicated for patients with haemodynamically unstable renal failure or septic shock. The technologist monitors the Arterial Blood Gas (ABG) report and vital signs to assess pH levels, lactate and bicarbonate levels, potassium, and other electrolytes. When these parameters are altered, the technologist seeks instructions from the nephrologists and executes them. They also provide continuous monitoring of the patients throughout the treatment, being available around the clock.

ADDITIONAL RESPONSIBILITIES

Vaccinations

Patients with Chronic Kidney Disease (CKD) should receive vaccinations for Hepatitis B, diphtheria, tetanus, influenza A and B, and Pneumococcus. The technician maintains records of the patients' immunisation status [3].

Renal Diet

The technologist also serves as a nutritionist, being aware of each patient's eating habits and tailoring their diet to meet their nutritional needs. They calculate the Body Mass Index (BMI) and assess it using nutritional methods such as Subjective Global Assessment (SGA), anthropometry, and bioimpedance. These patients are advised to avoid potassium-rich meals and processed foods [8].

Minor Procedures

The technologist assists the nephrologist in minor procedures such as temporary access catheterisation (Internal Jugular Vein (IJV), subclavian, femoral) and renal biopsy. They also handle catheter removal and control bleeding from the exit site. In cases where doctors are unavailable, the technologists are authorised to approve x-rays taken after catheterisation.

Renal Psychologist

The technologists also address the psychological needs of the patients. Renal psychologists work with all patients who have chronic renal failure or any renal condition. They provide encouragement, support, and strive to build a friendly relationship with the patients.

CONCLUSION(S)

Being a renal technologist is a privileged and satisfying profession that anyone can pursue. In the roles of a therapist, dietician, counselor, manager, and mentor in a patient's life, renal technologists have the opportunity to extend someone's life. They serve as the best antidote to their patients' diseases.

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