Implementation of Patient Specific Heparin Dosing in Fraser Health Renal Dialysis Units Projected to Save $106,530 annually

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Abstract

Introduction: During hemodialysis, heparin is used to maintain circuit patency. This is a high risk of infection, most units in BC use the entire contents of a 10 mL (1,000 units/mL) heparin vial for administration to a single patient during hemodialysis. The average patient only requires 4 mL.

Methods: In August 2014, the Fraser Health (FH) renal program with approval from the FH Pharmacy and Therapeutics committee and the FH infection control department, implemented patient specific heparin dosing for maintaining circuit patency. This initiative involved creating heparin prep-stations, developing a dosing chart and education/change management.

Results: Of surveyed nurses, 50% reported a reduction in heparin wastage. Overall cost savings is projected to be $106,530 per year for FH. Early data indicates no adverse events.

Conclusion: With proper implementation, the use of patient specific heparin doses is a potentially safe and effective waste reduction strategy in BC hemodialysis units. Long-term data is being collected.

Background

Hepatitis B virus is the most commonly transmitted blood borne disease in the hemodialysis setting (1). Hepatitis B and C viral infections in patients on hemodialysis result in an increased risk of hepatic complications and all-cause mortality (2, 3).

Case reports of hepatitis B transmission in hemodialysis centers in the 1990’s resulted in the Center for Disease Control (CDC) to recommend infection control practices in this setting (4, 5).

Many of these recommendations have been incorporated into FH dialysis unit infection control policies such as routine serological testing for hepatitis B surface antigen, administration of hepatitis B vaccinations and boosters, washing hands and changing gloves between patients, cleaning and disinfection procedures, and avoidance of supply sharing between patients. One example is the avoidance of sharing multi-dose vials where possible.

Therefore, most dialysis units in British Columbia use the entire contents of a 10 mL (1,000 units/mL) heparin vial for administration to a single patient during hemodialysis despite the average patient requiring only 4 mL (4,000 units) based on a chart review of 120 hemodialysis patients at Surrey Memorial Hospital. Wastage of heparin occurs every dialysis run.

Objective

To design and implement the usage of patient specific heparin doses in FH hemodialysis units when prescribed for hemodialysis circuit anticoagulation with the ultimate goal of reducing medication wastage while ensuring patient safety

Methods

First, the FH Renal Program obtained approval from the FH Pharmacy and Therapeutics committee as well as the FH Infection control department to implement a 1-year trial of using patient specific heparin dosing.

Then we did the following:

Created Heparin Stations in Non-patient Care Areas: In accordance with Accreditation Canada recommendations, clear, clean, and secure heparin stations were created in non-patient care areas for the storage of heparin vials and preparation of heparin syringes.

- The FH infection control department as well as the FH Medication Safety Pharmacist reviewed and approved the heparin stations

Implemented a Standardized Process:

1. Nurses are to determine a patient specific heparin dose (aka. total heparin volume) to be prepared for each dialysis using our Heparin Dosing Chart (described in next section)

2. The total heparin volume to be drawn in each syringe is written in each patient’s Kardenx. Nurses are reminded to update this when variables change.

3. Nurses are expected to perform hand hygiene and swab each vial with alcohol prior to drawing up heparin.

4. Nurses are to draw heparin doses from multi-dose vials (i.e. 1 vial can provide heparin doses for 2 patients).

5. Prepared heparin syringes, are labeled with the patient name and heparin volume.

6. An arbitrary expiry date of 24 hours (end of the day) once the multi-dose vial is punctured is set and clearly labelled on each vial

7. Evening staff are to discard any punctured vials at the end of their shift

Education of Hemo dialysis Nurses:

In-person education was provided by a pharmacy student, pharmacist, or nurse educator at all FH hemodialysis units:

- Abbotsford Community Dialysis Unit
- Abbotsford Regional Hospital
- Newton Community Dialysis Unit
- Panorama Community Dialysis Unit
- Royal City Community Dialysis Unit
- Royal Columbia Hospital
- Surrey Memorial Hospital
- Tri-Cities Community Dialysis Unit

Development of a Heparin Dosing Chart:

- To assist nurses in determining a patient’s heparin dose or total volume to prepare, we created a dosing chart.

This chart incorporates 3 variables:

1. Heparin bolus
2. Heparin infusion rate per hour
3. Duration of dialysis

Values include a 2 mL overfill (1 mL to prime the tubing and 1 mL to prevent the activation of the heparin alarm at the end of the run) and numbers are rounded to the nearest 0.5 mL. Note, heparin stop time for patients with a graft or fistula is not incorporated resulting in some excess heparin usage.

Expections to the dosing chart:

- When rate, bolus, or duration falls outside the range of the dosing chart, heparin volume is calculated using the following formula:

  Rate (units/hr) x Duration (hr) + Bolus (units)

  Round up to the nearest 0.5 mL and +2 mL overfill

- When heparin runs out early and a replacement syringe is required, heparin volume is calculated using the following formula:

  Rate (units/hr) x duration remaining (hr)

  Round up to the nearest 0.5 mL and +1 mL overfill

Evaluation Plan:

1. A survey was distributed to community hemodialysis nurses in August 2014

2. At 6 months (January 2015), heparin usage per month will be compared months preceding implementation to determine waste reduction.

3. Adverse heparin events reported in the Patient Safety and Learning System (PSLS) will be monitored by the FH Renal Medication Quality and Safety Committee as well as new hepatitis diagnoses picked up on routine screening.

Results

Survey:

In the first 2 weeks of survey launch, a total of 16 FH community dialysis nurses responded to our survey.

Safety parameters

Likelihood of reporting to PSLS when medication error is discovered

Consider using heparin as multi-dose for more than one patient does not reduce patient safety

Uncertain if using heparin as multi-dose for more than one patient does not reduce patient safety

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Conclusion

Patient specific heparin dosing for maintaining circuit patency is a waste reduction strategy that can result in significant cost savings in hemodialysis units.

Safety data needs to be reported back to front-line staff to develop confidence in this initiative. Expect a higher incidence of running out of heparin during a dialysis session – this is easily corrected by drawing up more heparin.

Long-term data is required and is being collected.

References


