The Impact of Erythropoietin-Stimulating Agent Supply Shortages in Fraser Health Hemodialysis Units and Recommendations for Improvement

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Background

- Erythropoietin-Stimulating Agents (ESAs) such as epoetin alfa (Eprex®) and darbepoetin alfa (Aranesp®) are used as a primary treatment method for approximately 80% of hemodialysis patients with anemia of CKD.
- In BC, ESAs for patients with CKD are fully covered by the BC Provincial Renal Agency (BCPRA) with distribution overseen by a partnered community pharmacy.
- There are frequent supply disruptions at Fraser Health in-centre hemodialysis units (Abbotsford Regional Hospital, Royal Columbian Hospital and Surrey Memorial Hospital), resulting in missed doses-potentially resulting in worsened symptoms of anemia and ultimately an increased requirement for blood transfusions.

Objective

The objective of this study was to examine the time taken away from direct patient care by the healthcare team due to unintentional ESA supply disruption compared to when there is sufficient supply.

Methods

Inventory Data

Frequency of supply disruption

- the percentage of inventory reports over one-year period where a given strength of epoetin and darbepoetin indicate zero supply

Additional cost associated with supply disruption

- Shipping manifests from deliveries between designated shipment dates counted over a one-year period
- Cost: number of shipping manifests x cost of delivery

PSLS Data

Extent of patients missing doses

- Data was filtered by ward, date, and drug type to count the number of missed doses in a given year
- Indicate the level of harm associated with missed doses

Survey Data

Additional time each member takes to arrange alternative supply

- Targeted nurses, pharmacists and pharmacy technicians
- values were added to find total time taken to manage a shortage per respondent.
- For each health profession, the mean time to manage shortage was calculated by taking the average of all participants.

Associated cost to provide alternative supply

- Average time taken for each professional x wage per hour (midpoint per union grid)

Results

Fig 1. Percentage of inventory reports that indicate zero supply

Fig 2. Total time taken by each health professional when ESA shortage occurs

- All nurses handle shortage by documenting missed dose in patient chart; 86% of nurses communicate with other healthcare team members and 95% of nurses combine 2 different strengths to make up missing dose
- Most common task by pharmacist is communicating with other healthcare members about shortage
- Only 10% of nurses report on PSLs
  - 7 reports over one year period; all cases at RCH
  - No harm: six cases; minor harm: one case

	SMH	RCH	ARH	Total
Number of ESA shortages per year	9	17	12	38
Annual time consumed for nurses, pharmacists, and pharmacy technician (minutes)	599	1131	798	2528
Annual cost for healthcare provider time	\$329.40	\$622.20	\$439.20	\$1390.80
Annual cost for deliveries	\$63.00	\$14.00	\$35.00	\$112.00

Discussion

Patients are likely not missing doses and at low risk of anemia. Delivery fees did not contribute meaningfully to overall cost, but the estimated annual cost of healthcare provider time was significant. Cost may be underestimated since it is based on inventory reports that is updated every few weeks, not on the number days per year. It was assumed that every time a shortage occurs, each survey participant completes all tasks reported. There were varied responses as to when staff should file a report on PSLs.

There should be a standardized schedule once weekly to monitor inventory and be vigilant about ordering when supply is low. The following chart is a set of standard operating procedures to be more efficient and eliminate discrepancies.

Nurse	Clinical Pharmacy Technician
Contact pharmacy technician to determine if an alternative supply can be arranged before the end of hemodialysis (HD). If no supply can be obtained before the end of the current dialysis run, determine if available ESA strengths can be combined to make the required dose.	Check when next ESA shipment arrives. If next ESA shipment will not arrive prior to end of current HD, contact in-patient pharmacy to check if required strengths can be borrowed. If not, inform nurse and pharmacist.
If no supply can be obtained and required dose cannot be made, contact physician or pharmacist to determine if the dose can be missed or if an alternate dose can be given and document the action in the chart. If three consecutive doses of ESA are missed, submit a report in PSLs	Pharmacist Obtain history from patient, chart, nurse and clinical pharmacy technician and assess the clinical status of the patient's anemia. Write new ESA dose or discuss with physician if appropriate and provide required monitoring (order labs, assess patient at next clinic visit)

Conclusion

There is frequent ESA supply disruption that although not as many patients are directly affected, has significant impact on cost and time. The results establish the current baseline, and future work should focus on resolving the issue.

References

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