




Anticoagulant Project

Funded by the Ontario Ministry of Health and Long-Term Care

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Acknowledgements

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Medication Safety Support Service (MSSS) Advisory Group

- Ontario Ministry of Health and Long-Term Care
- Ontario College of Pharmacists
- Canadian Society of Hospital Pharmacists - Ontario Branch
- College of Physicians and Surgeons of Ontario
- Ontario Medical Association
- Ontario Hospital Association
- Institute for Safe Medication Practices Canada
- Registered Nurses Association of Ontario
- College of Nurses of Ontario
- Ontario Pharmacists' Association



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Anticoagulation Strategies

Need to Anticoagulate.....

Need to Anticoagulate SAFELY.....



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Anticoagulation Strategies

Enhance VTE prophylaxis

- "Errors of omission"

Enhance Heparin storage and administration

- "Errors of commission"



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Heparin Storage – A Patient Safety Priority

Case #1 - ISMP Canada Safety Bulletin, Vol 6, Issue 10,
December 30, 2006

- Patient with a triple lumen central venous access device
- Received heparin flush in each lumen 3 times daily
- Post op day 5, aPTT > 180 seconds
- Outcome - Intracranial hemorrhage

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Heparin Storage – A Patient Safety Priority

Case #2 - ISMP Safety Alert, September 21, 2006

- Neonatal ward in Mid Western US hospital
- Heparin 10,000 units / mL improperly stocked in dispensing cabinet for 10 units / mL vial
- Products look similar
- Nurses flushed with incorrect product
- Outcome – 3 premature infant deaths

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Heparin Storage – A Patient Safety Priority



Vials similar to those confused.

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Heparin Storage – A Patient Safety Priority

Questions:

- Is there a problem?
- Why so many choices?
- What is the current state of heparin storage in Ontario?
- What is contributing to the current usage patterns?
- How can we improve storage?

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Heparin Storage – A Patient Safety Priority

ISMP Canada Safety Bulletin, Vol 4, Issue 10,
October, 2004

A Need to "Flush" Out High Concentration Heparin Products



Figure 1: From left to right: Heparin Lock Flush 100 units/mL (green); Heparino-Lok® 10 units/mL (pink); Heparin injection 1,000 units/mL - 10mL and 1mL (black); and Heparin 10,000 units/mL - 5mL and 1mL (red).

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Current Heparin Products

Concentration/mL	Concentration/Total Volume	Unit Size
10 Units/mL	10 Units/mL	1 mL
10 Units/mL	100 Units/10 mL	10 mL
100 Units/mL	200 Units/2 mL	2 mL
100 Units/mL	1,000 Units/10 mL	10 mL
1,000 Units/mL	1,000 Units/mL	1 mL
1,000 Units/mL	10,000 Units/10 mL	10 mL
1,000 Units/mL	30,000 Units/30 mL	30 mL
10,000 Units/mL	10,000 Units/mL	1mL
10,000 Units/mL	50,000 Units/5 mL	5mL
25,000 Units/mL*	5,000 Units/0.2 mL	0.2 mL
25,000 Units/mL	50,000 Units/2 mL	2 mL

* High concentration product, however unit dose ampoule provides only 5,000 units.

ISMP Canada Safety Bulletin, Vol 4, Issue 10, October, 2004

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Heparin-Related Products

- Low Molecular Weight Heparins
 - Enoxaparin
 - Dalteparin
 - Tinzaparin
 - Nadroparin
- Fondaparinux

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Heparin Uses

Heparin Flushes	Heparin IV	Heparin 1,000 units in 10 mL
VTE prophylaxis	Heparin SC or LMWH SC	Heparin 5,000 units SC or LMWH 2,500 to 5,000 anti Xa units SC
VTE treatment	Heparin bolus plus infusion	Heparin 5,000 units IV followed by 1,000 units per hour (approx)
	LMWH SC	LMWH 15,000 units SC (approx)
Acute Coronary Syndromes	Heparin bolus plus infusion	Heparin 5,000 units IV followed by 1,000 units per hour (approx)
	LMWH SC	Enoxaparin 1 mg / kg
	Fondaparinux SC	Fondaparinux 2.5 mg SC

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Heparin Uses

Heparin Flushes

- Limited evidence
- Routine use not recommended

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Heparin Error Potential

Number of products
 X
 Number of concentrations
 X
 Number of uses / formats

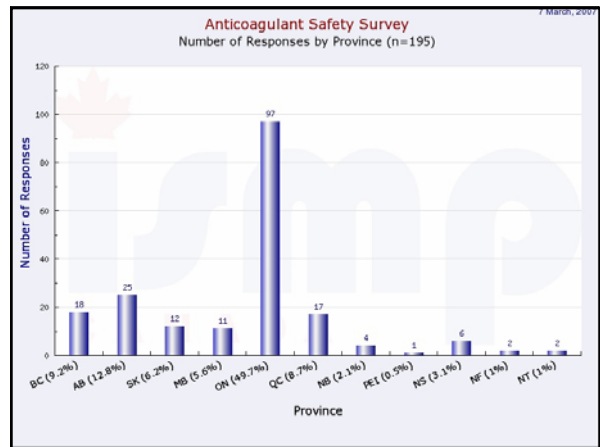
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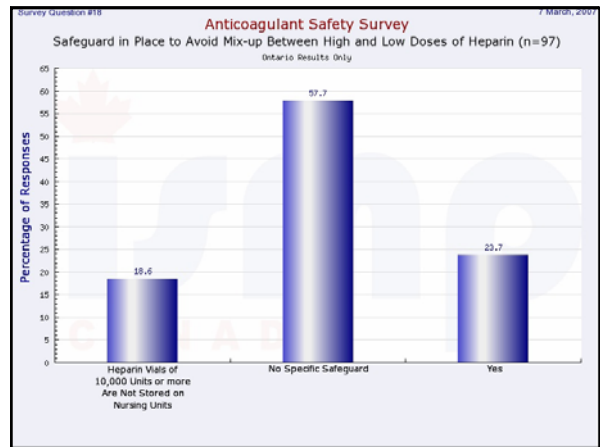
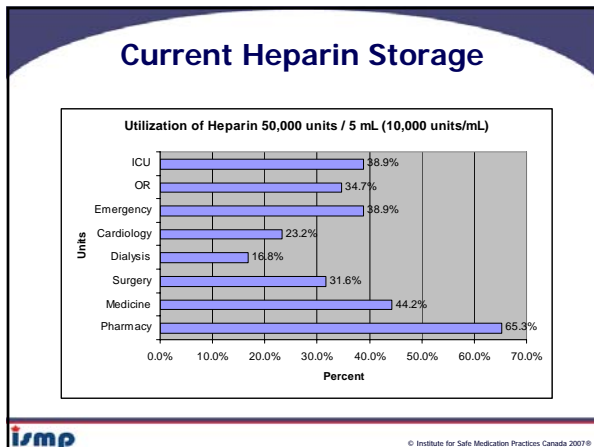
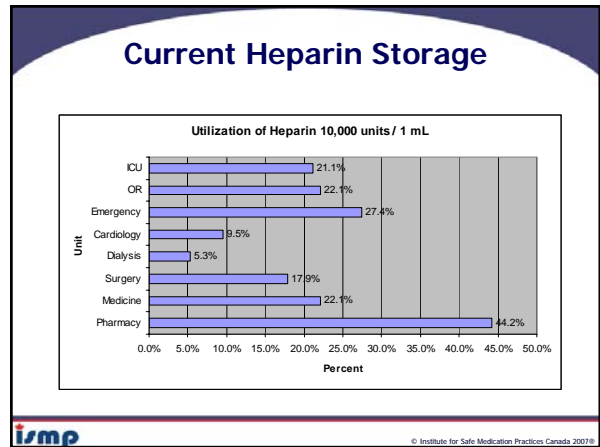
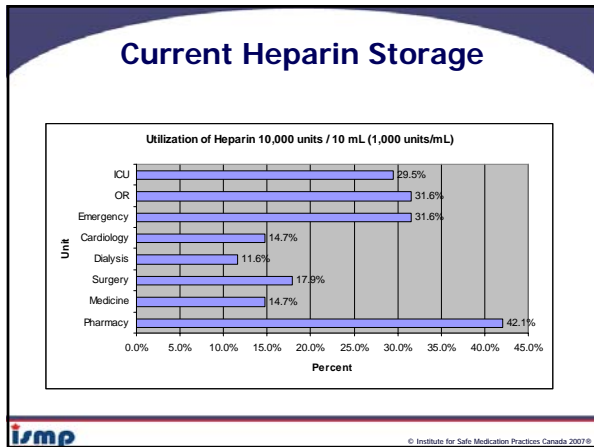
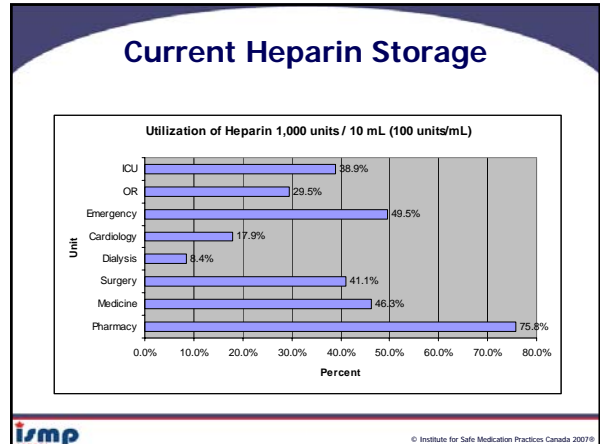
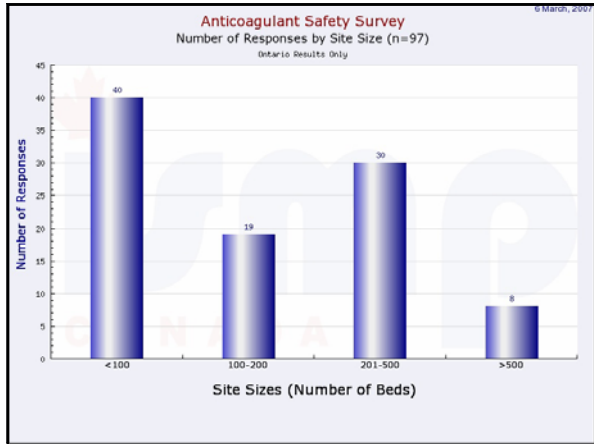
Current Heparin Storage

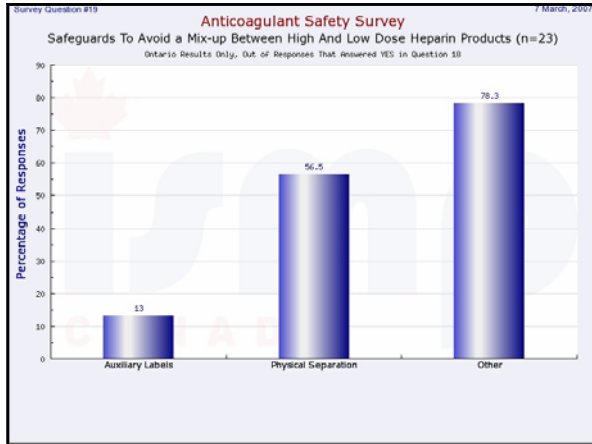
Canadian Hospital Survey

- 29 question survey sent to 856 healthcare facilities across Canada
- Addressing a variety of anticoagulant topics including heparin storage
- Response:
 - 195 responses nation-wide
 - Representing 38,350 hospital beds

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Current Heparin Storage

Summary

- High dose / concentration products prevalent
- Stocked with lower dose products (flushes)
- Few interventions made ←

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Intervention

The Goal

- Ensure appropriate use of heparin
- Develop safety strategies to minimize selection errors

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Recommendations

- Complete an audit of heparin storage throughout hospital
- Ensure appropriate use of heparin
- Reduce the number of potential high-risk situations in patient care areas

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ISMP Canada

Resource Kit Development

- Expert advisory panel formed
 - Develop process to achieve goals
 - Identifying / creating tools to facilitate
 - Analysis
 - Product choices
 - Information sharing

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Recommendation 1: Heparin Audit

Systematic Process for Heparin Review

1. Existing Heparin Storage
 - All patient care areas
2. Remove infrequently used products

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Recommendation 2: Appropriate Use

- Determine appropriate heparin usage
 - Standardize by indication

Considerations:

- VTE prophylaxis re evidence-based guidelines
 - Increase use
- Consider LMWH use
- Peripheral intravenous line flush
 - Decrease use



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Recommendation 3: Reduce Heparin Risk

- Remove formats of high dose heparin products from stock in patient care areas:
 - 50,000 units/5 mL
 - 50,000 units/2 mL
- Review and reduce, where possible, availability of the following products in patient care areas:
 - 10,000 units/1 mL
 - 10,000 units/10 mL
- Develop strategy to minimize number of concentrations in patient care areas
 - Stocking both heparin flushes and SC / IV doses



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Recommendation 3: Reduced Heparin Risk

Determine proposed heparin utilization

- Limit number of products by patient area

Determine proposed heparin storage

- Utilize separation, labelling and other techniques to differentiate products



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Audit and Assessment Tool

- Step by step approach
- Documentation (pre and post)
- Impact analysis



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Cost Analysis

Costs – Single dose

Heparin Format	Cost*
Heparin 5,000 unit pre-filled syringe (Healthmark)	\$2.00
Heparin 5,000 / 0.2 mL amp	\$1.29
Heparin 10,000 units / 1 mL vial	\$1.34
Heparin 50,000 units / 2 mL vial	\$0.92
Heparin 50,000 units / 5 mL vial	\$0.38
Heparin 500 unit pre-filled syringe (Healthmark)	\$0.87
Heparin 1,000 units / 10 mL	\$1.90

*Based on average contract prices



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Cost Analysis

Estimated annual costs for VTE prophylaxis

Heparin Format	Cost*
Heparin 5,000 unit pre-filled syringe (Healthmark)	\$93,659
Heparin 5,000 / 0.2 mL amp	\$60,410
Heparin 10,000 units / 1 mL vial	\$62,752
Heparin 50,000 units / 2 mL vial	\$43,083
Heparin 50,000 units / 5 mL vial	\$17,795

*Assuming average VTE prophylaxis rates in a 400 bed acute care facility



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LMWH Storage

- Currently either multidose vials or pre-filled syringes
- Multidose vials pose a safety threat
 - May be more concentrated
 - Represents large drug quantity per vial
- No cost differential for pre-filled syringes



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Heparin Safety Strategies Experience

Pilot Site: Royal Victoria Hospital of Barrie

Judy Chong



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Implementation

General Strategies

- Safe Medication Practices committee endorses removal of high concentration heparin products
 - Review of products ,indications and order sets
 - Educate and collaboratively remove high concentration heparin from stock
- Minimize stock of heparin products
 - Individual patient prescriptions where possible



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Implementation

Royal Victoria Hospital Experience

- Unit by unit removal of 10,000 unit/ mL heparin vials initial area ER
- Protocol driven practices using pathways
- Use of LMWH
- Use of 5,000 unit pre-filled syringes
- Use of sodium citrate for renal patients



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Implementation

Royal Victoria Hospital Experience

- Successes
 - Greater awareness in organization of safety issues with high concentration heparin
 - Collaboration of medical, nursing and pharmacy staff
 - Support of patient care areas to standardized protocols and pre-loaded syringes



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Implementation

Royal Victoria Hospital Experience

- Challenges
 - Time for consultation process
 - Storage space on units
 - Additional costs for pre-filled syringes
 - Unique renal unit needs



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Implementation

Royal Victoria Hospital Experience

- Next Steps
 - Continue to work with patient care areas to remove stock heparin
 - Provide products on a patient specific basis
 - Continue to work with pathways to review protocols
 - Evaluate usage

Questions?