Anticoagulant Project

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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

Anticoagulation Strategies

Need to Anticoagulate.....

Need to Anticoagulate SAFELY.....

Anticoagulation Strategies

Enhance DVT VTE? prophylaxis

- "Errors of omission"

Enhance Heparin storage and administration

- "Errors of commission"

Why Heparin?

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

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

Heparin Storage – A Patient Safety Priority

Vials similar to those confused.

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?

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); Hepalean-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).

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

Heparin-Related Products

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

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**

Heparin Uses

Heparin Flushes

- Limited evidence
- Routine use not recommended

Heparin Error Potential

Number of products

X

Number of concentrations

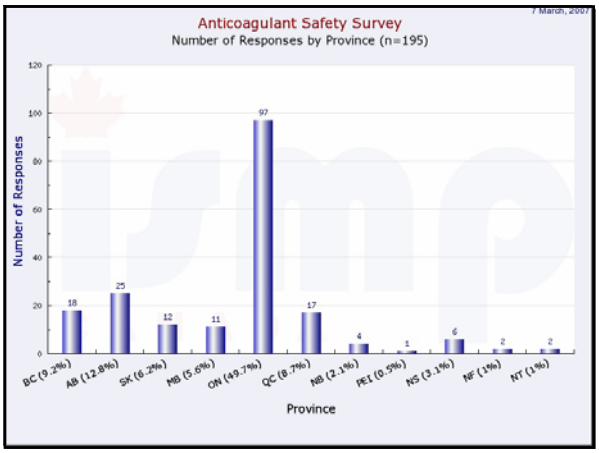
X

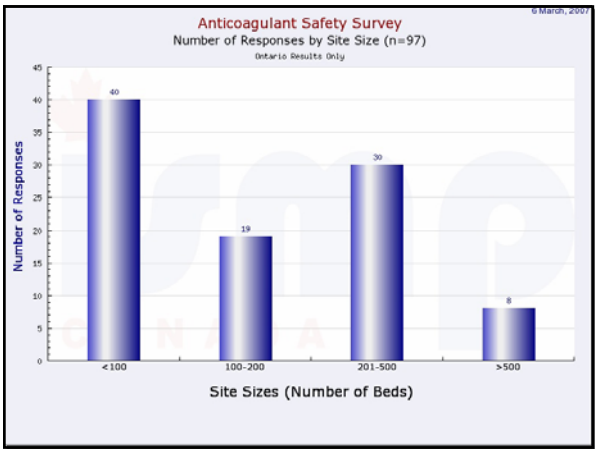
Number of uses / formats

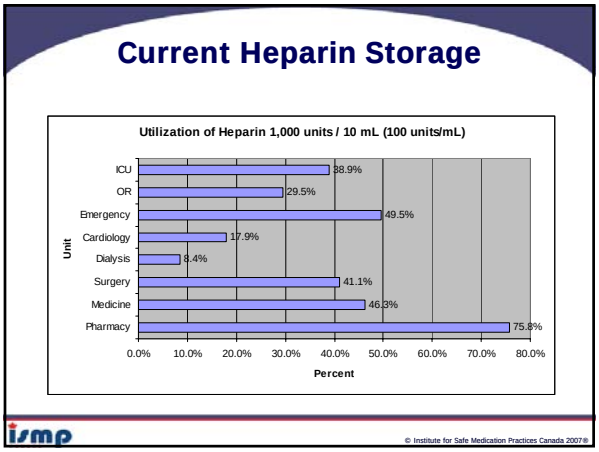
Current Heparin Storage

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


7 March, 2007
Anticoagulant Safety Survey
Number of Responses by Province (n=195)
Number of Responses
Province
BC (9.2%)
AB (12.8%)
SK (6.2%)
MB (5.6%)
ON (49.7%)
QC (8.7%)
NB (2.1%)
PEI (0.5%)
NS (3.1%)
NF (1%)
NT (1%)
18
25
12
11
97
17
4
1
6
2
2


6 March, 2007
Anticoagulant Safety Survey
Number of Responses by Site Size (n=97)
Ontario Results Only
Number of Responses
Site Sizes (Number of Beds)
<100
100-200
201-500
>500
40
19
30
8


Current Heparin Storage
Utilization of Heparin 1,000 units / 10 mL (100 units/mL)
Unit
Percent
ICU 38.9%
OR 29.5%
Emergency 49.5%
Cardiology 17.9%
Dialysis 8.4%
Surgery 41.1%
Medicine 46.3%
Pharmacy 75.8%
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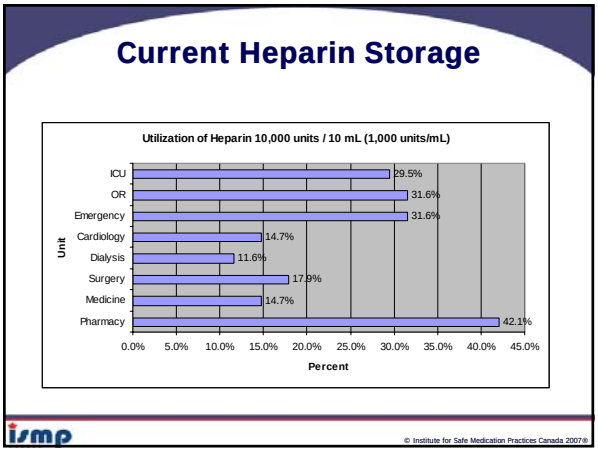
Current Heparin Storage
Utilization of Heparin 10,000 units / 10 mL (1,000 units/mL)
Unit
Percent
ICU 29.5%
OR 31.6%
Emergency 31.6%
Cardiology 14.7%
Dialysis 11.6%
Surgery 17.9%
Medicine 14.7%
Pharmacy 42.1%
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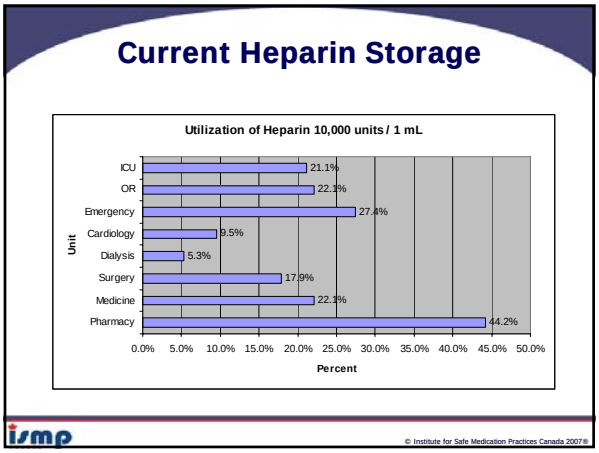
Current Heparin Storage
Utilization of Heparin 10,000 units / 1 mL
Unit
Percent
ICU 21.1%
OR 22.1%
Emergency 27.4%
Cardiology 9.5%
Dialysis 5.3%
Surgery 17.9%
Medicine 22.1%
Pharmacy 44.2%
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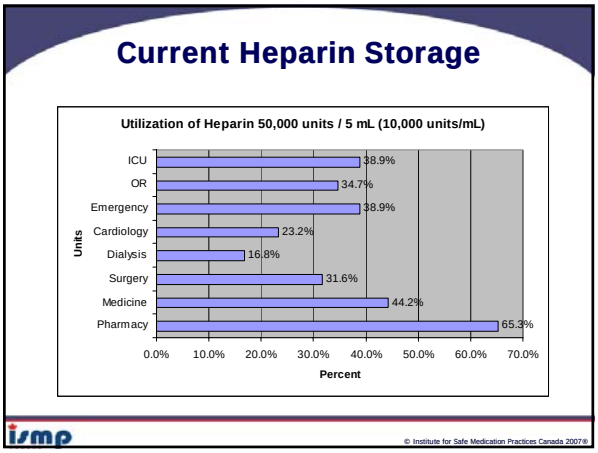
Current Heparin Storage
Utilization of Heparin 50,000 units / 5 mL (10,000 units/mL)
Units
Percent
ICU 38.9%
OR 34.7%
Emergency 38.9%
Cardiology 23.2%
Dialysis 16.8%
Surgery 31.6%
Medicine 44.2%
Pharmacy 65.3%
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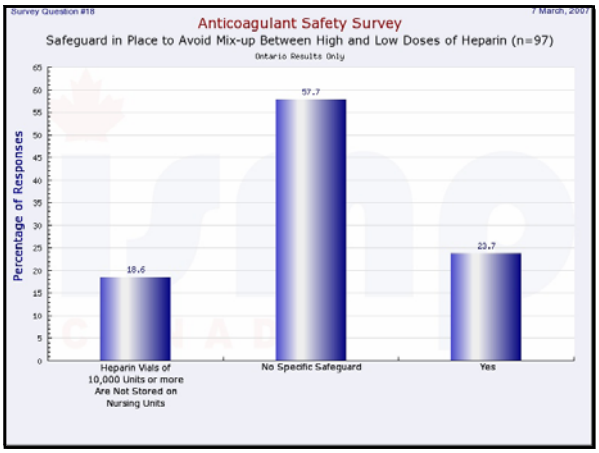

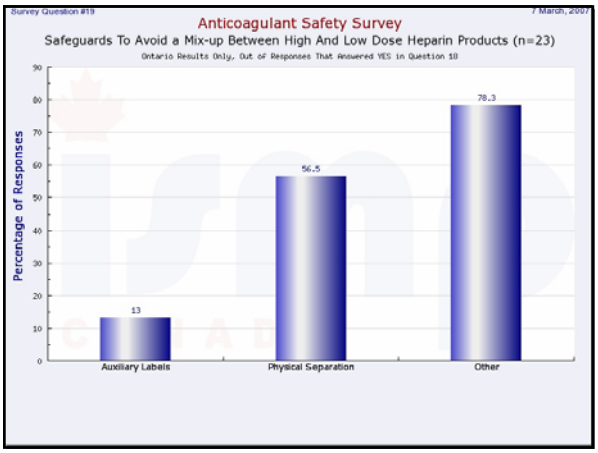

Current Heparin Storage

Summary

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

Intervention

The Goal

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

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

ISMP Canada

Resource Kit Development

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

Recommendation 1: Heparin Audit

Systematic Process for Heparin Review

1. Existing Heparin Storage
   - All patient care areas
2. Remove infrequently used products
3. Determine appropriate heparin usage
   - Standardize by indication
   - Consider limiting use of heparin flushes

Recommendation 1: Heparin Audit

Systematic Process for Heparin Review

4. Risk Assessment
   - Any heparin 10,000 or 50,000 unit products
   - Stocking both heparin flushes and SC / IV doses
5. Determine proposed heparin utilization
   - Limit number of products by patient area
6. Determine proposed heparin storage
   - Utilize separation, labelling and other techniques to differentiate products

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

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

Recommendation 2: Appropriate Use

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

Recommendation 3: Reduce Heparin Risk

- Remove high concentration heparin
  - 50,000 units/5mL and 50,000 units/2mL vials
  - 10,000 units/1mL vials
- Develop strategy to minimize number of concentrations in patient care areas

LMWH Storage is this heparin?

- 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

Heparin Safety Strategies Experience

Pilot Site: Toronto East General Hospital

Carmine Stumpo

Implementation

General Strategies

- Consider the Entire System of Heparin Usage
  - All formats
  - All uses
- Utilize a team approach
  - Pharmacy, Nursing, Physicians, etc.…

Implementation

Toronto East General Hospital Experience

- Overall heparin usage:
  - Protocol-based prescribing
  - Simplify choices
  - Promote LMWH

Implementation

Toronto East General Hospital Experience

- Comprehensive review of wardstock
  - Numerous unexpected findings
  - Removed all heparin 10,000 and 50,000 unit vials
    - Converted to prefilled heparin syringes
    - Limited heparin flush vials
    - Exception – cardiac cath lab

Implementation

Toronto East General Hospital Experience

- Successes
  - Smooth transition
    - Dedicated technician time to standardize new storage environment
  - Well-received by nursing staff

Implementation

Toronto East General Hospital Experience

- Challenges
  - Increased cost
    - Offset with other drug savings with new generic drugs to market
  - Storage space on units
  - Understanding new utilization patterns
    - Reduced wastage

Questions?