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Mercury Use, Release and Reduction Initiatives at NS Hospitals

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Introduction

- Mercury (Hg) is a persistent, toxic, bioaccumulative substance that poses serious health risks to humans and wildlife
- Hospitals use a variety of products that contain Hg, such as thermometers, blood pressure cuffs, fluorescent lamps, batteries, lab chemicals and cleaning products
- Hg is released from hospitals by: incineration of medical waste; landfilling of Hg-containing solid waste; and releases into wastewater

Introduction (continued)

- Hospitals have an opportunity to play a key role in protecting public health and the environment by minimizing their use and release of Hg-containing products and waste
- Some NS hospitals have already implemented programs to reduce mercury use and release but the status of those types of initiatives at other large hospitals in NS was unknown

Methods

- Hospitals in NS with more than 80 beds were selected as study sites - 17 study sites
- A questionnaire was developed and used to determine Hg use patterns at those facilities
- On two occasions, a 24 hour composite sample of the final wastewater from each facility was collected and analyzed for total Hg concentrations
- A flow measurement was taken of the wastewater discharge to estimate Hg loadings









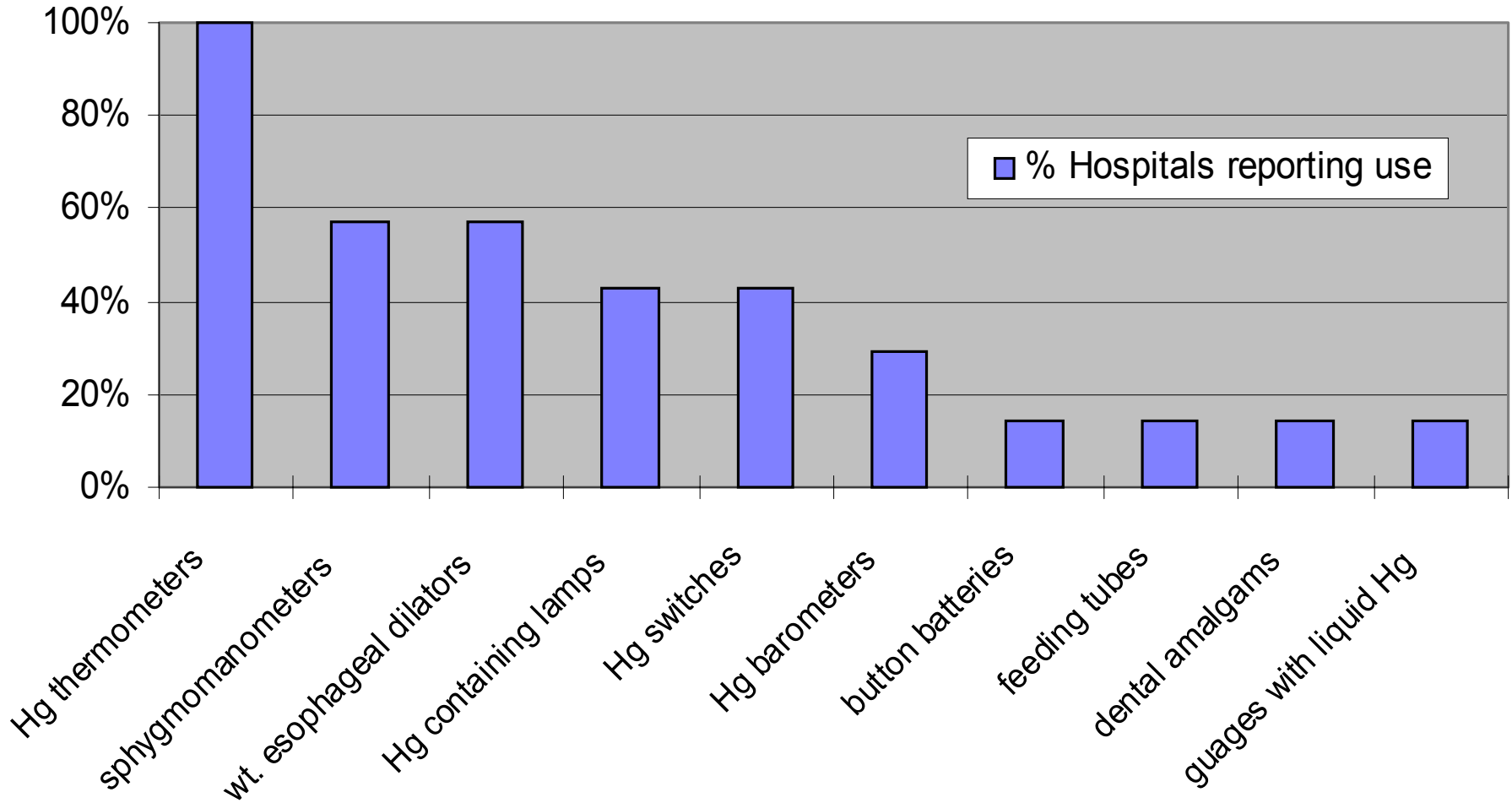
Hg Use Pattern Assessment

- Seven of the 17 study hospitals provided information on Hg-containing equipment, products and lab chemicals
- Nine of the 17 study hospitals provided information on their Hg policies, programmes and practices

Results - Hg-containing Equipment and Products

- All hospitals reported using limited quantities of Hg-containing thermometers; other equipment and products had varying levels of use
- Weighted esophageal dilators and blood pressure cuffs accounted for the majority of the total Hg by volume at all of the study sites, 96% of the estimated 106,320 grams
- Disposal methods varied widely between hospitals; at least two facilities were disposing Hg-containing items incorrectly (incineration, general solid waste)

Fig. 1. Summary of Hg use at seven NS Hospitals in Clinical, Facility and Laboratory Equipment and Products



Results - Hg Use in Lab Chemicals

- Five chemicals/products accounted for approximately 98% of the estimated 750 g of Hg used at all sites : B5 Fixative; mercurochrome; Hg chloride; Zenker's solution; and Hg (II) oxide
- Most hospitals use commercial hazardous waste companies for disposal of unused chemicals or wastes but some hospitals pour chemicals (fixatives) down the drain

Results - Hg policies and practices

Hg purchasing	X	X	X	X					
ID of Hg-containing products	X	X	X	X		X			
Inventory of Hg-containing products	X	X	X						
Hg disposal	X	X		X	X			X	
Hg spills clean-up	X	X	X	X	X	X			
	<i>Cape Breton</i>	<i>St. Martha's</i>	<i>QEII</i>	<i>Fisherman's Mem.</i>	<i>Aberdeen</i>	<i>IWK-Grace</i>	<i>Yarmouth Regional</i>	<i>Highland View</i>	<i>Colchester</i>

X = policy/procedure implemented

Fig. 2. Percent of Hospitals with Hg purchasing policy developed and in use

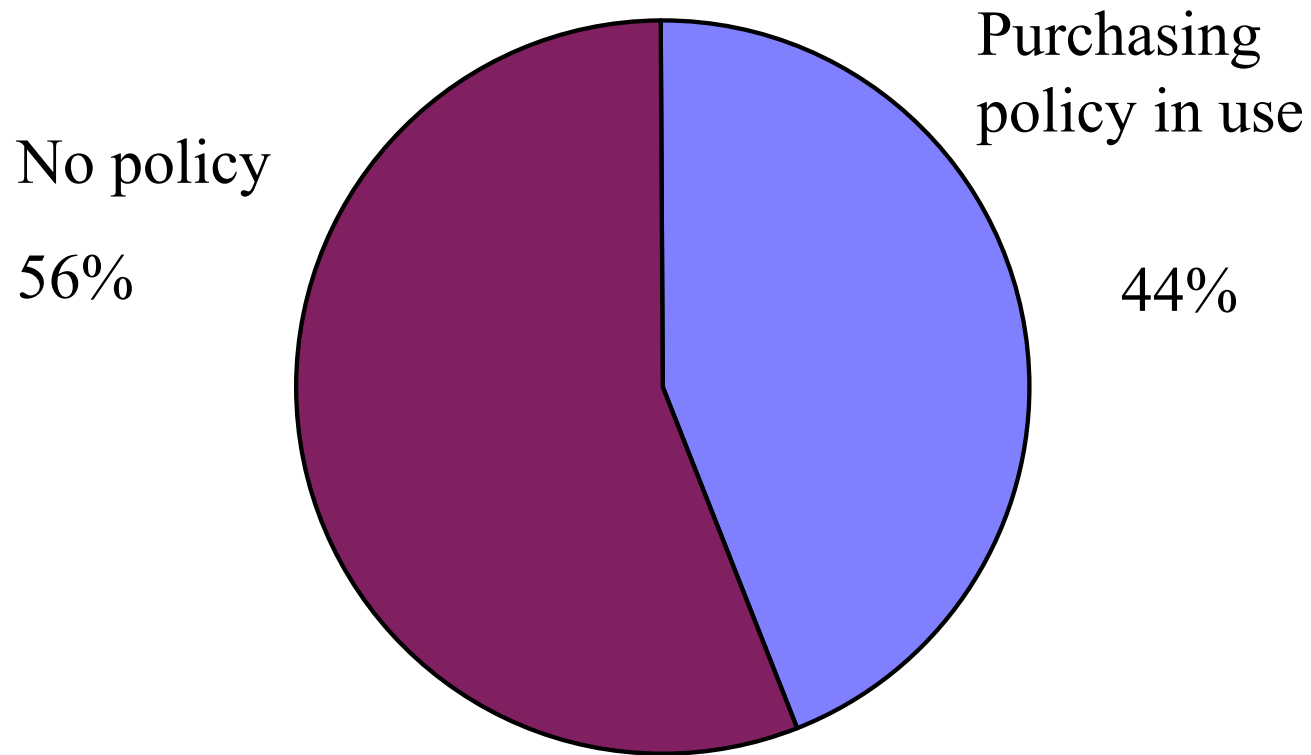


Fig. 3. Percent of Hospitals with policy for identification and inventory of Hg products

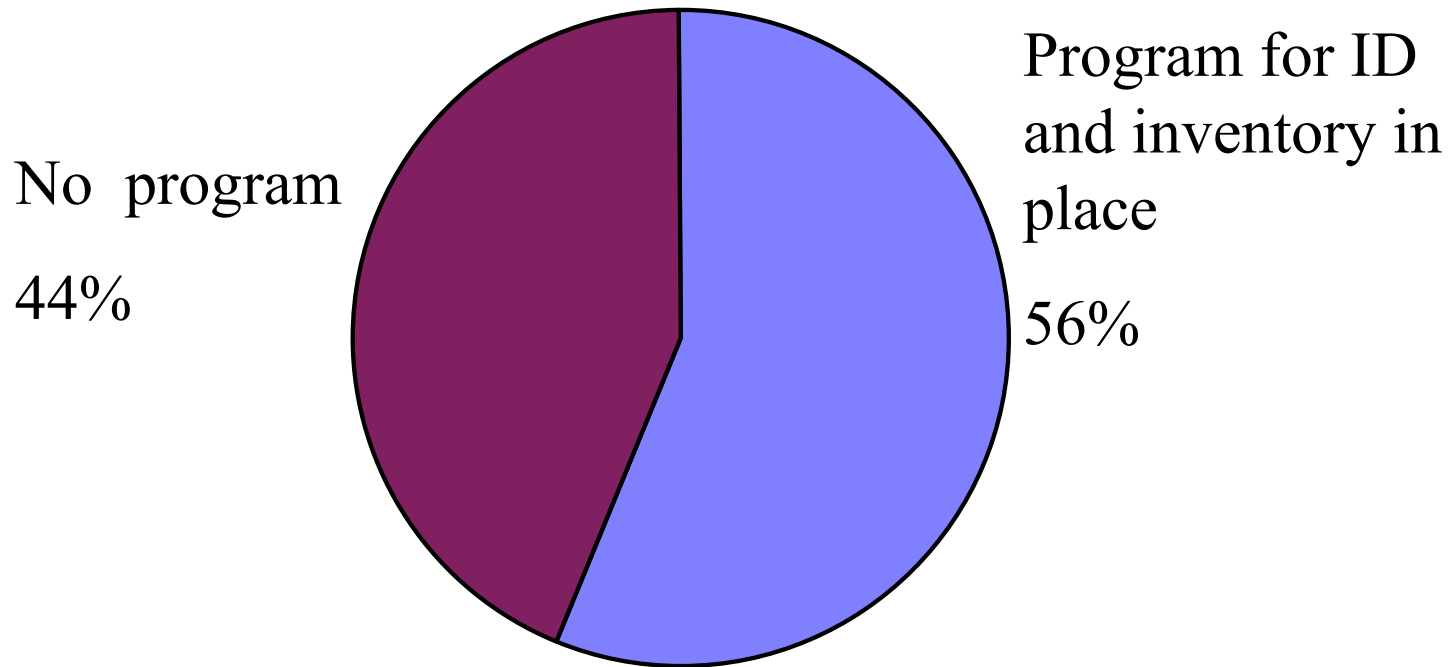


Fig. 4. Percent of Hospitals with proper procedures for the disposal of Hg

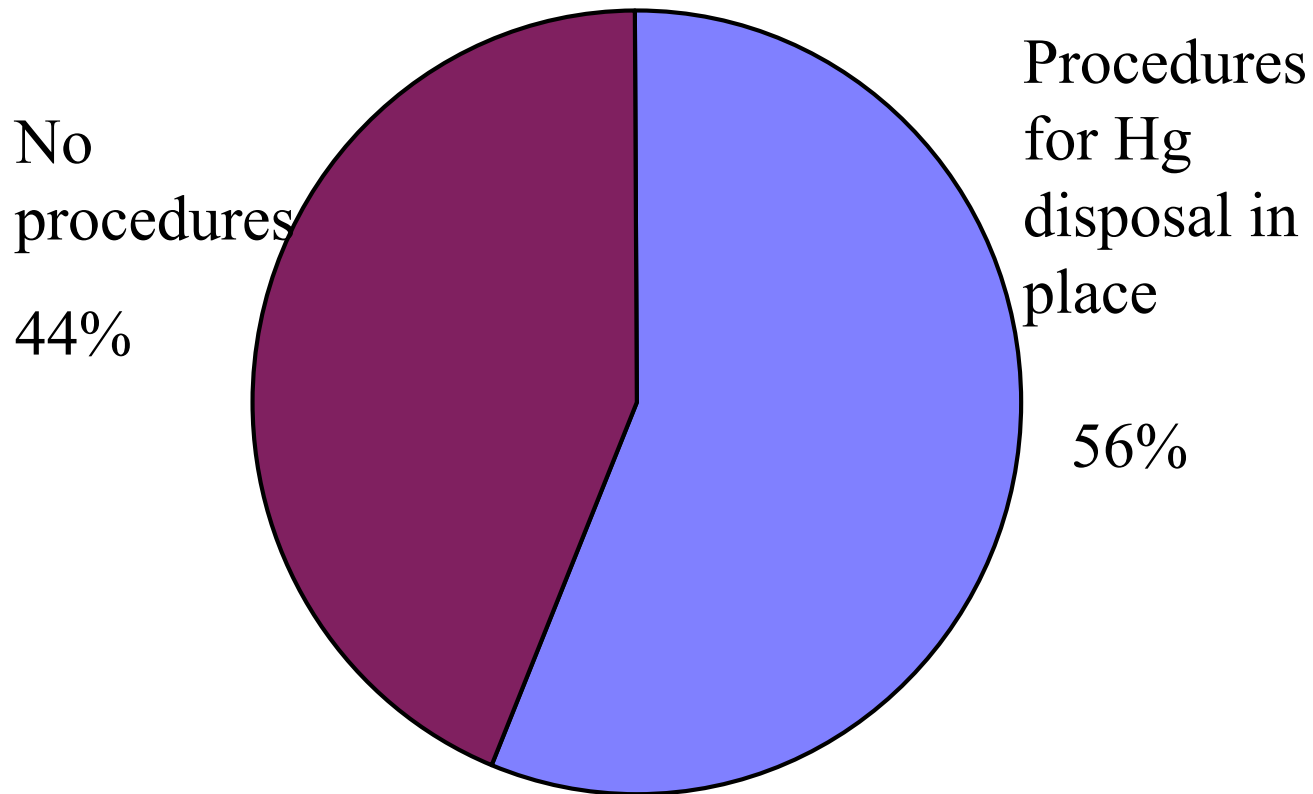
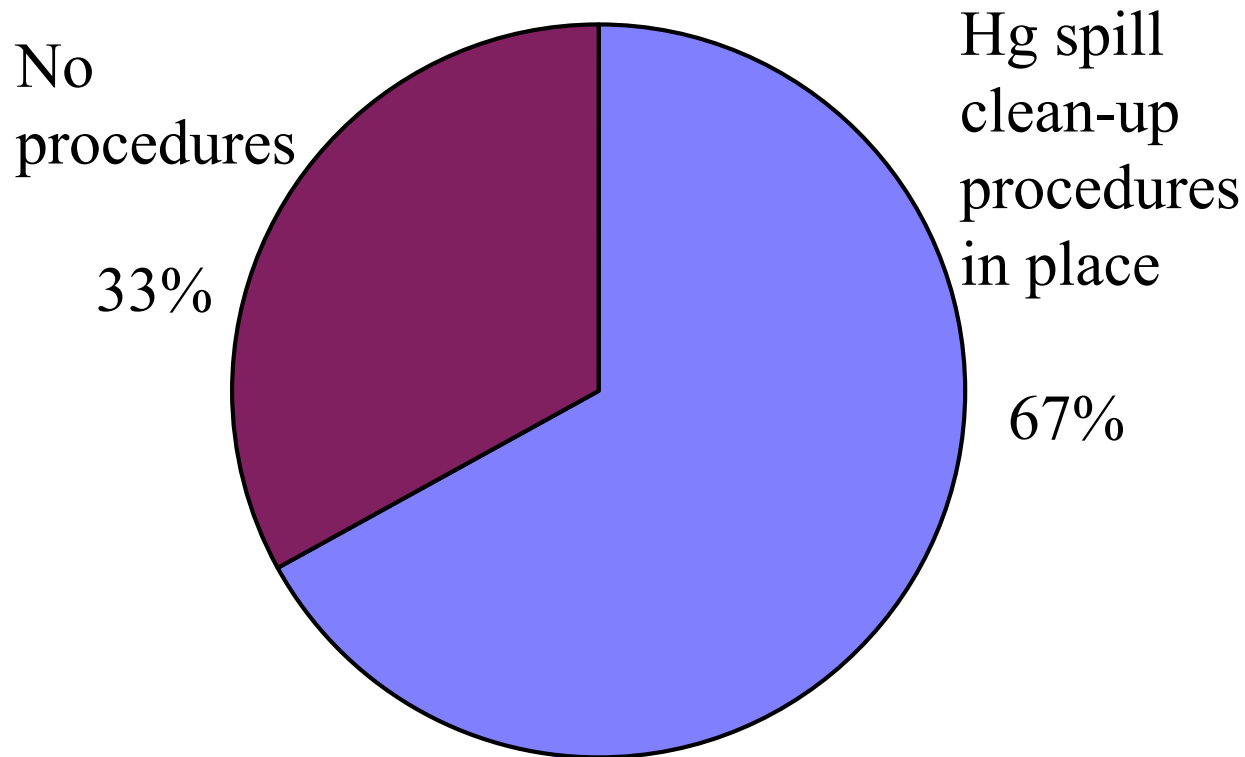


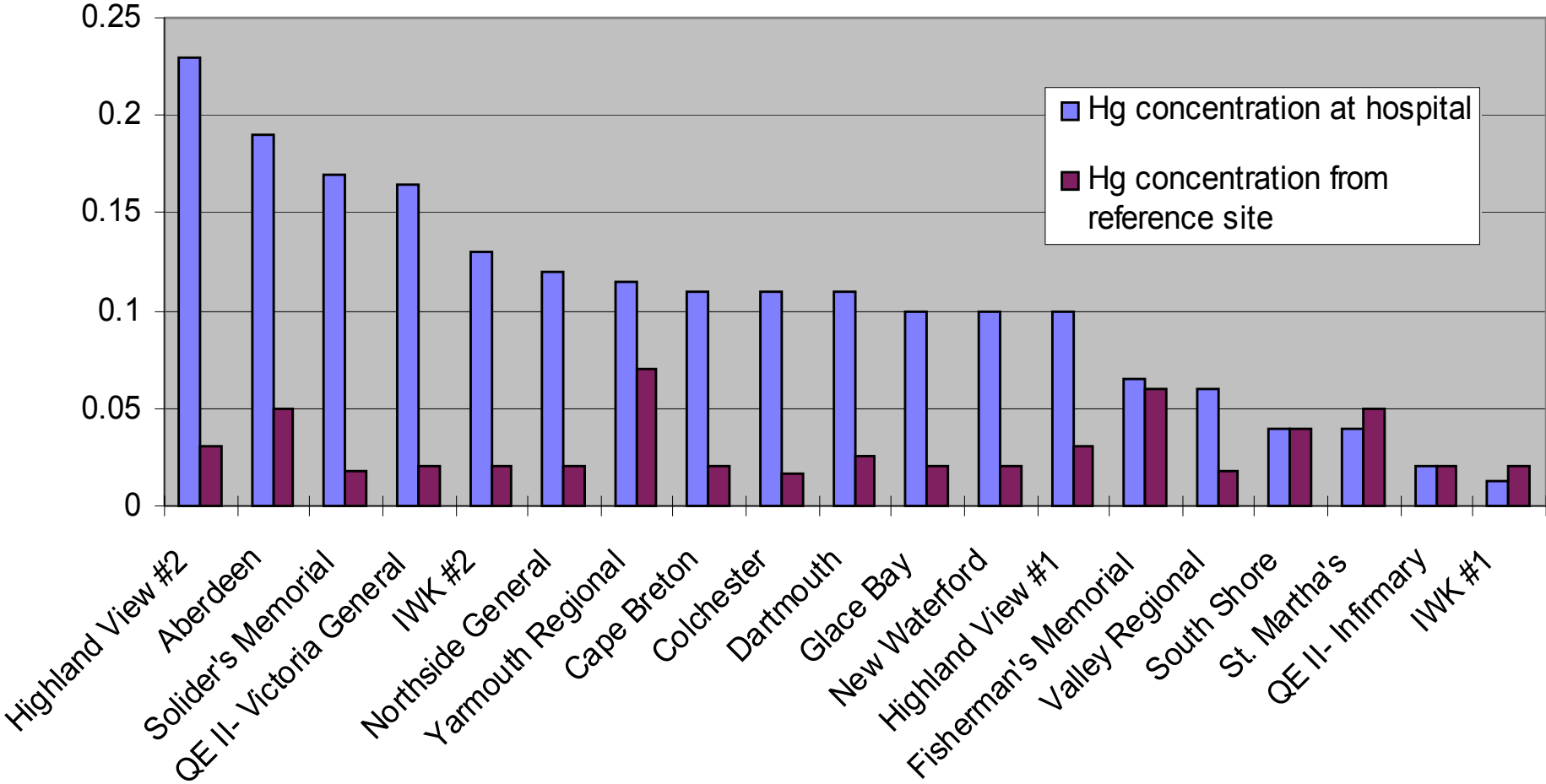
Fig. 5. Percent of Hospitals with clean-up procedures for Hg spills



Wastewater Assessment

- Total Hg concentrations in hospital wastewaters ranged from 0.0064 to 0.26 $\mu\text{g/L}$ with a mean concentration of 0.10 $\mu\text{g/L}$
- Mean Hg concentrations from hospitals were 3.3 times higher than mean concentrations from reference sites, not influenced by hospital discharges (0.03 $\mu\text{g/L}$)

Fig. 6. Mean Hg concentrations (ug/L) in Wastewater Samples from NS Hospitals and Reference sites



Wastewater Assessment (continued)

- Total Hg concentrations in hospital wastewaters were far below the Service Nova Scotia and Municipal Relations model sewer discharge by-law for NS communities (100 $\mu\text{g/L}$) and the HRM wastewater discharge by-law (10 $\mu\text{g/L}$)
- However, 16 of the 17 hospitals surveyed had Hg concentrations within the range of concentrations (0.03 to 1.6 $\mu\text{g/L}$) that has caused impaired reproduction in sensitive aquatic organisms

Wastewater Loadings

- Estimated annual Hg loadings ranged from 3.21 to 138.6 g/yr with an average discharge of 65.3 g/yr
- Using the most conservative estimate for each site, at a minimum an estimated 375 g of Hg are released annually in wastewater from the 17 hospitals surveyed
- One gram of Hg released per year is enough to contaminate all the fish in a lake with a surface area of 8 hectares

Summary

- While many hospitals have already made efforts to reduce Hg use and implement Hg management practices, there appears to be many opportunities to reduce Hg use at most hospitals in NS
- Hospitals indicated a lack of information on identifying less obvious sources of Hg and on sample policies/practices as barriers to implementing Hg reduction programmes

Summary (continued)

All NS hospitals should take steps to become a Hg-free facility:

- Lead person for env mgmt activities
- Hg inventory and replace with non-hazardous alternatives
- Hg phase-out policy – train purchasing officers
- Review and revise Hg disposal and clean-up procedures

Summary (continued)

- Despite efforts to reduce Hg use at some hospitals, Hg concentrations in hospital wastewaters remain higher than background concentrations raising doubts about the effectiveness of those measures
- A follow-up study should be conducted to determine whether Hg-contaminated sludge in hospital plumbing systems is responsible for the contamination of hospital wastewaters and to identify hot spots within hospital operations to allow a further evaluation of P2 opportunities in those facilities

Follow-up planned

- Sample sludge from traps at key locations in two hospitals to identify “hot spots”
- “pig” plumbing pipes in selected areas
- Sample final wastewater before and after plumbing pipes cleaned
- If concentrations remain elevated, review hospital Hg management procedures
- Conduct a workshop for NS hospitals on Hg reduction strategies and other P2 opportunities