Prediction of Medical Waste from Selected Hospital Statistics

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Segregation of Hospital Waste

- Regulated medical waste
- Sharps
- Recyclables
- Solid waste

OSHA Definition of Regulated Medical Waste

Regulated waste means liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps and pathological and microbiological wastes containing blood or other potentially infectious materials.

Goals of this Study

- Intermediate Goal: To determine variables that had a significant association with regulated medical waste values within a United States hospital system

- Ultimate Goal: To relate types of medical textiles used to pounds of regulated medical waste

Literature Review: Factors Affecting Volume of Medical Waste

- Management practices can affect volume of both infectious and general wastes.

- Hospitals for a Healthy Environment (Practice Greenhealth) contends that many hospitals put 50% to 70% of their waste into the biohazardous waste stream when that number could be lower.

- Case studies show that with appropriate education and incentives, hospitals can decrease red bag waste to 6% to 10% of their waste stream

Other Factors Associated with Hospital Medical Waste

- Changes in legislation

- Number of beds

- Bed occupancy

- Number of outpatients per day

- Type of medical establishment
    - Medical center
    - Regional hospital
    - Local hospital
    - Clinics/others

Methodology

- Administrators in a major United States hospital system were approached regarding cooperation in this project. They agreed to share data on number of surgical gowns purchased each year for a 3 year period, number of drapes, number of surgical packs, number of inpatient surgeries, number of outpatient surgeries, and pounds of medical waste.

Sample

- Data were obtained from a total of 35 hospitals

- For five of the hospitals, medical waste data were not available so the final sample consisted of 30 hospitals.

Analyses

- Pearson correlations were used to determine the relation between medical waste and each predictor taken by itself.
- Stepwise multiple regression was used to create a multivariate model for medical waste
- Analysis of the shape of the relationships between the independent variables and the dependent variable was used to check on assumptions underlying the regression model
- The analyses were repeated with lagged data for the purchase of gowns, drapes, packs, and total units purchased

Why Lagged Data?

- As I confirmed with our colleague from Medline yesterday, it would be rare to find drapes, gowns, or surgical packs with an expiration date. Therefore, a large purchase one year could end up as waste the next year.

The univariate analyses indicated that all variables had positive and significant correlations with medical waste except for number of surgical packs. Number of packs had a negative and nonsignificant relationship with medical waste.

Univariate Analysis of Selected Predictors of Medical Waste

Variables	R values	p values
Beds	.67	<.0001
IP surgeries	.64	<.0001
Tot. surgeries	.48	<.0001
OP surgeries	.32	.0033
Gowns	.30	.0044
Drapes	.30	.0055
Total units	.30	.0052
Packs	-.09	NS

Multivariate Model for Predicting Volume of Medical Waste

Number of beds, as indicated by the univariate analyses, was the best predictor so entered the equation first. Number of inpatient surgeries added significant information to the equation.

Multivariate Model for Predicting Medical Waste

| Variables	Model R^2	p Values
Beds	.44	<.0001
Inpatient Surgeries	.49	.0058

Shapes of the Relationships between Independent and Dependent Variables

- In general, the relationships were found to be linear. One exception was the relationship between number of beds and medical waste. Waste did not increase as rapidly in the middle of the range as it did at either end. This finding suggests that medium sized hospitals (91 to 250 beds) deserve further attention for best practices or economies of scale.

Similarity to a Previous MUSES Project

- Compared to small hospitals and large hospitals, medium sized hospitals were willing to pay more for an innovative medical textile product.

- Medium sized hospitals may have more resources to afford innovative products and practices without the administrative layers that can delay taking action

Additive Components for logmedwaste
With 95% Confidence Limits
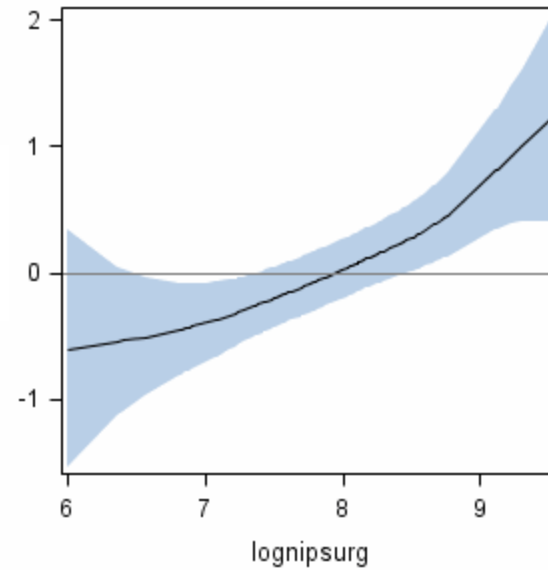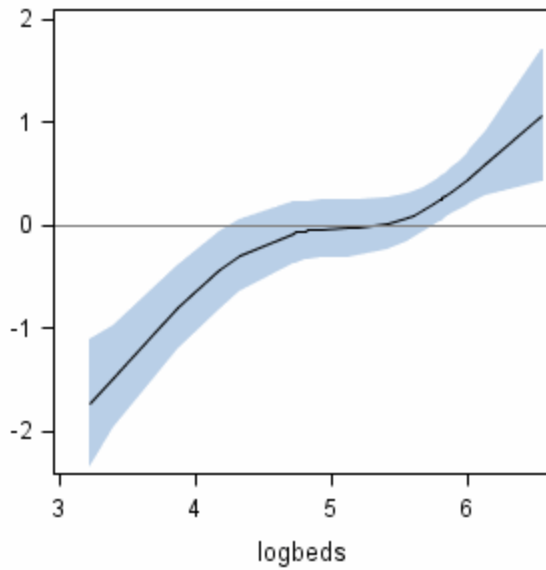
Analyses Including Lagged Data

Addition of lagged data (under the assumption that products purchased in one year may not be used until the next) produced similar results to the analyses without lagged data so are not included in this presentation.

Why the Relatively Low Correlations between Product Purchases and Waste?

- According to one informant, much of the hospital waste is opened but unused medical supplies. To reduce this waste, some of the hospitals are working with MedShare, a nonprofit organization that is "dedicated to improving the environment and healthcare through the efficient recovery and redistribution of surplus medical supplies and equipment to underserved healthcare facilities in developing countries."

Another Example of A Factor Complicating Analysis of Medical Textiles and Hospital Waste

Hybrid packs that include both disposable and reusable products.