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Considering risks to healthcare workers from glutaraldehyde alternatives in high-level disinfection

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Summary Due to concerns over glutaraldehyde's toxicity, two substitutes have recently been introduced; *ortho*-phthalaldehyde (OPA), and a mixture of hydrogen peroxide and peracetic acid. There is limited information about the health effects for employees from these products. This study assesses the current practices regarding the use of high-level disinfectants in British Columbian hospitals and predicts the relative toxicities of each product. Industry practices were compiled using a comprehensive survey of current practices and decision processes in all hospitals in British Columbia. Of 95 hospitals, 64 returned surveys; 80% of these used high-level disinfection. Among user hospitals, 49% used glutaraldehyde alone and 51% had introduced alternatives. Concern about staff health was the most common reason for substituting, but this was frequently not considered when choosing specific alternatives. Hospitals that involved occupational health, infection control or regional staff in high-level disinfectant decisions used glutaraldehyde alternatives less often. In most hospitals, it was difficult to find individuals who were knowledgeable about the use of disinfectants. Potential health effects associated with each type of high-level disinfectant were assessed by review of the published literature and available manufacturers' data along with qualitative structure–activity relationship analysis. Results indicated that although all products irritate the skin and

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respiratory tract, OPA is a potential dermal and respiratory sensitizer but hydrogen peroxide and peracetic acid do not cause allergic reactions. Despite little being known about the risks to employees from glutaraldehyde alternatives, their use is widespread. The potential risks of all high-level disinfectants are serious; thus regulators and users are faced with important risk management decisions before and after they have been introduced into the workplace.

Introduction

High-level disinfection (HLD) is a cleaning process that kills all micro-organisms except bacterial spores.[1] For the past 40 years, glutaraldehyde (in 2–4% solution with water) has been the primary chemical used for HLD. Glutaraldehyde is highly effective but it has been associated with a number of serious health problems among employees, including dermatitis and occupational asthma.[2-5] In 1999 and 2000, two new high-level disinfectants were introduced to the market: Cidex OPA® [0.55% *ortho*-phthalaldehyde (OPA) solution] and Compliance™ (0.23% peracetic acid/7.35% hydrogen peroxide). Both were promoted as safer alternatives to glutaraldehyde even though there was little evidence available to support (or refute) such claims. Although substitution of hazardous chemicals is generally considered to be good practice for reducing risk in the workplace, replacing a known hazard with a chemical with largely unknown toxicity may not be a solution. Basic toxicology data may not be sufficient to determine the potential health effects of new chemicals, and unknown problems may surface later. It is easy to assume that a substance is not hazardous just because it is not known to have serious health effects. A lack of knowledge should be taken as a warning rather than an indication of safety.[6] This project used the example of HLD to examine issues surrounding chemical substitution and employee health, particularly in the acute-care sector of the healthcare industry.

This paper describes the results of a two-part study involving a survey of current practices relating to high-level disinfectant use in hospitals and a review of toxicity data for a range of high-level disinfectant chemicals. As the survey was exploratory in nature, it was not designed to test any preformed hypotheses. The purpose of the survey was to gather information about which chemicals were being used, where they were being used and the decision processes for choosing high-level disinfectant chemicals. The purpose of the toxicity review was to assess all available health information for existing high-level disinfectant products, with particular attention to newer glutaraldehyde alternatives and their relative sensitization potential.

Methods

Survey development and implementation

The survey population included all acute-care hospitals in British Columbia, Canada. A letter explaining the purpose and format of the survey was mailed to the Chief Executive Officers of each Regional Health Board, Community Health Council, Community Health Service Society, and related healthcare unions in British Columbia. A database was created to include the occupational health manager or other personnel responsible for HLD within each hospital.

Product research and key informant interviews with hospital staff from several Vancouver hospitals were used to facilitate development of a mail-out questionnaire. The questionnaire was designed to assess practices related to the use of high-level disinfectants within hospitals. Telephone follow-up was performed to increase the response rate and to gather additional information from respondents.

Data analysis

Survey responses were coded and entered into a data file. Each respondent hospital was assigned to one of three size categories based on the number of admissions per year. Hospitals were also categorized as rural, town or urban according to the population of the municipality in which they were located. Data pertaining to the number of employees working in each hospital were obtained from the Healthcare Benefit Trust, which administers benefit plans to all full-time permanent employees.