

**LATEX ALLERGY AS AN OCCUPATIONAL RISK**

**SALISBURY STATE UNIVERSITY**

by

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**LATEX ALLERGY AS AN OCCUPATIONAL RISK**

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## ABSTRACT

Title of Thesis: Latex Allergy as an Occupational Risk

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Latex allergy has become one of the buzzwords in healthcare in this final decade of this century. Occupational exposure to latex products coupled with the remaining risk factors of atopy, food allergy, neural defects and surgery, often place the healthcare worker at great jeopardy. The purpose of this study was to determine the prevalence of latex sensitivity in a mid-Atlantic medical center. Using a cross-sectional design and an original questionnaire, a sample population of the employees of the medical center were surveyed to determine prevalence as well as factors placing the employees at risk. Significant findings included correlation between atopy and symptoms of latex sensitivity and between food allergy and symptoms of latex sensitivity. Approximately 90% of the employees sampled at this rural medical center possess at least one of the risk factors determined to be causative in the development of latex sensitivity. Of those identified as being at risk, only 3.2% reported a physician diagnosed latex allergy. However, 25.1% of the sample reported symptoms when handling latex products. Clearly, symptoms of latex sensitivity are found within this employee population which merits further investigation. Further study including biophysiological measures for those reporting latex allergy symptoms would be important to determine IgE mediated allergic response.

**Dedicated to my husband, Jonathan,  
and my children, Elizabeth and Matthew,  
for their patience and love.**

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# Latex Allergy As an Occupational Risk

## Chapter I

### Introduction

Once an unknown phenomenon, the subject of latex allergy has fast become the buzz word of the 90's in healthcare circles as well as in the lay media. With the institution of Universal Precautions in 1987 by the Centers for Disease Control, the use of latex gloves has been a requirement for many aspects of health care practice. With continued and prolonged use of latex gloves, increasingly more healthcare workers report skin irritation or contact dermatitis (Heese, van Hintzenstern, Peters, Koch & Hornstein, 1991). In a classic research project in 1991, Sussman, Tarlo and Dolovich reported that exposure to latex products can produce, not only contact dermatitis in the wearer, but IgE-mediated latex allergy as well. Immunoglobulin E (IgE) antibodies are produced in an allergic response to an allergen, causing atopic conditions, such as rhinitis, asthma and even anaphylaxis. Indeed, in a four year period between 1988 and 1992, the Food and Drug Administration received over 1000 reports of systemic latex allergy reactions, fifteen of them fatal (Sussman & Beezhold, 1995). What was once an unusual and annoying occurrence has evolved into a potentially life threatening risk affecting thousands of persons.

The purpose of this study was to determine the prevalence of latex sensitivity in the employee population at a mid-Atlantic rural medical center. Symptoms from direct contact with latex products present only a fraction of the exposure possibilities. Studies show that the latex antigen becomes aerosolized due to the leaching of latex into glove powder that becomes airborne. Allergic respiratory symptoms such as

rhinoconjunctivitis and asthma can be the sequelae from this airborne latex aeroallergen (Warshaw, 1998). Prevalence studies are appearing in the literature with increasing frequency. Many populations are the subjects of these studies, from a specific medical practice to an entire staff of a large hospital.

### Significance

The body of knowledge concerning latex allergy as an occupational risk needs to grow and expand. "Healthcare workers develop sensitization from regular latex exposure: wearing latex gloves or inhaling aerosolized latex in the workplace" (Sussman & Beezhold, 1995, p. 43). Latex products in hospitals and healthcare settings abound due to the superior properties of this natural product. These superior properties include resiliency, strength and elasticity (Warshaw, 1998). Therefore, careful avoidance of latex in the healthcare setting and identification of latex sensitive persons are imperative for the protection of the employee. The administration of a mid-Atlantic medical center, although supportive of the annual latex allergy mandatory education offered to employees, has no institution-specific information on which to make decisions concerning the safety of the employee population. Knowledge of the prevalence of the sensitivity in the employee population should be one of the first steps in an occupational health strategic plan for an institution. In this situation, the importance to nursing through the identification of an occupational risk, expands to healthcare workers as a cohort. Because of their holistic approach and concern for health prevention, nurses can be advocates for all of their peers within the healthcare arena.

### Purpose of the Study

The objective for this study was to explore the prevalence and its relationship to risk factors of latex sensitization among employees of a rural acute care hospital. The information was made available to the administration of the medical center to assist the institution in providing a safer working environment.

Because limiting exposure to latex represents primary and secondary prevention in developing or exacerbating latex sensitization, becoming a “minimal latex” or “latex-safe” facility can benefit both employees and clients. Without information concerning prevalence of latex allergy, hospital administrators hold a very low level of concern about pursuing a status of “minimal latex.” The elimination of latex products in a hospital brings an economic consideration due to a higher price tag on non-latex products with protective properties comparable to latex. Latex free gloves can cost three to five times the price of latex gloves (No One Formula for Glove Purchasing Decision, 1997). However, supporting an employee who becomes permanently disabled due to their latex allergy can prove to be even more costly. Data based information is much more convincing to a hospital administration than a unsupported concepts or ideas. From a human resources point of view, "to be able to boast of a latex safe workplace can be a key recruitment tool" (Johns, 1998, p. 44). The second objective of this project was to provide data capable of persuading the rural medical center administration to strive toward becoming a “minimal latex” facility.

## Hypotheses

As research discovers and explains the nature of latex sensitivity, many variables and risk factors have emerged. It is these risk factors that must be further explored as we determine the occupational risk for health care workers (HCW). With this consideration, the following hypotheses were investigated in this study.

### Hypothesis 1

There is a direct relationship between occupational exposure to latex and symptoms of latex sensitivity.

Particularly in the allergy and occupational literature, many explorations of the risk of exposure to latex products have been published in recent years. Clearly, occupational exposure to latex contributes to the development of latex sensitivity. It is upon these studies that this hypothesis was developed. Studies conducted in Toronto, Hong Kong, Germany, Ontario, and Cleveland looked at occupational exposure to latex in correlation to skin prick test results and/or serum analysis for the latex antigen. Research by Tarlo, Sussman and Holness (1997), Liss et al. (1996), Mace, et al. (1997), Safadi, et al. (1996), and Leung, Ho, Chan, Choy and Lai (1997) surveyed employees of health care institutions by questionnaire. Questions on the surveys distributed asked for specific and/or general information concerning the employees' exposure to latex in the workplace. Employees then underwent skin prick tests and/or serum tests to determine a biophysiologic measurement of their latex sensitivity. There was statistical significance in the correlation between the results of the biophysiologic tests and positive responses on the questionnaire to occupational exposure.

Another study by Allmers, et al. (1998) investigated the relationship between latex aeroallergens and health care workers. Correlation was determined to be significant for healthcare worker who were occupationally exposed to airborne latex due to powdered gloves in a hospital setting. A control unit in the same hospital used no powdered gloves during the study period. Workers on the control unit who regularly used asthma medications because of latex sensitivity were able to decrease or eliminate their medication use.

### Hypothesis 2

There is a direct relationship between atopy and symptoms of latex sensitivity.

Five studies investigating the relationship between atopy and latex sensitivity were conducted on health care workers in several countries. Research by Watts, Jacobs, Forrester and Bartolucci (1998), Leung, Ho, Chan, Choy and Lai (1997), Brown, Schauble and Hamilton (1998), Kibby and Akl (1997), and Douglas, Morton, Czarny and O'Hehir (1997) found significant correlation between atopy to environmental allergens and latex sensitivity. Atopy has been shown to be a common risk factor in the development of latex sensitivity and has been chosen as an hypothesis in the study at hand.

### Hypothesis 3

There is a direct relationship between reported food allergy and symptoms of latex sensitivity.

Food allergy as correlated to latex sensitivity, has been studied in recent years by a number of research teams. The following studies suggested to an investigation concerning the correlation of food allergy and latex sensitivity. Mace, et al. (1997)

tested for the variable of food allergy in studies involving hospital workers. A *p* value of .003 associated with food allergy and latex skin test supports the hypothesis in this study that a relationship exists between food allergy and latex sensitivity.

Brehler, Theissen, Mohr and Luger (1997) studied a group of documented latex sensitive patients in Germany for cross-reactivity between fruit allergy and latex sensitivity. Sixty nine percent (69.1%) of the patients also tested positive for fruit allergies by serum analysis (RAST).

In a study conducted by Mikkola, et al. (1998) cross reactivity between latex and bananas was investigated in a latex allergic population in Finland. This study, one of the first studies of its kind, included a very complex and highly technical analysis of the proteins found in latex and banana. The authors concluded, "These results suggest that the commonly occurring hypersensitivity to banana in patients allergic to NRL [natural rubber latex] could be explained by cross-reacting IgE antibodies binding to epitopes in hevein [latex] and in a hevein-like domain of a previously undescribed endochitinase in banana" (p. 1005).

A case study by Freeman in 1997 described a 6-year-old boy who presented to a clinic in Arizona with the complaint of allergy to banana and avocado. Further questioning of the mother by the author revealed several incidents in which the child required emergency care after dental visits. The mother also reported the child's milk intolerance and history of previous surgery. Immunologic tests by skin prick test and serum analysis for latex, banana, avocado, chestnut and kiwi confirmed the diagnosis of latex and food allergies.

#### Hypothesis 4

There is direct relationship between number of surgeries and symptoms of latex sensitivity.

Several prevalence studies in the recent past looked at number of surgeries as a variable or risk factor in developing a latex sensitivity. Porri, et al. (1997a), Porri, et al. (1997b), Shah, Cawley, Gleeson, O'Connor and McGeady (1998), and Brown, Schauble and Hamilton (1998) looked at number of surgeries as a risk factor in studies in the United States and in France. The study by Shah, et al. (1998) was conducted at the A.I. duPont Hospital for Children in Wilmington, Delaware and investigated children and adolescents with meningomyelocele. Significance was determined between number of surgical procedures and the presence of positive allergen skin test responses.

The research by Porri, et al. (1997a, 1997b) did not find significance between number of surgeries and latex sensitization in patients being interviewed and screened for future surgery. Although the authors did not recommend routine latex screening for preoperative patients in the general population, they encouraged this practice in health care workers and children with spina bifida. These two populations of preoperative patients possess the additional risk factors of occupational exposure and neural defect. The population in the study at hand is identified as health care workers with occupational exposure. Therefore, this hypothesis was investigated.

#### Conclusion

Much research exploring the risk factors associated with the development of latex sensitivity has been conducted in the past decade. Through the research

exploring many considerations, the following risk factors have been indicated as contributing to the development of a latex sensitivity: atopy; allergy to food, especially kiwi, bananas, avocado and chestnuts; previous surgery and exposure to latex products. For the persons identified as possessing these risk factors precautions can be taken to prevent the development of a latex sensitivity or the exacerbation of that sensitivity. The primary goal of the study presented in this paper is to identify the prevalence of the persons at risk in a mid-Atlantic rural medical center and to find correlation between the risk factors in the population surveyed.



## Chapter II

### A Review of the Literature

This chapter will critically review contemporary literature and early studies on the subject of latex allergy, both as a phenomenon and as an occupational risk. While latex was recognized as a cause of contact dermatitis since the late 1970's, latex allergy as an important and common phenomenon did not reach the medical literature in great abundance until the beginning of the current decade.

Latex allergy, although a global term, actually can be differentiated by type. Contact dermatitis, considered a delayed response, is usually triggered by the chemicals used to process the natural rubber latex into a commercial product (Gonzalez, 1992). Characterized by inflammatory erythematous lesions, the lesions appear as a delayed response, possibly several days after the exposure (Kobrynski, 1996).

Type IV allergy, or cell-mediated reaction, presents as a local response with urticaria, erythema and edema. Response is usually immediate and remains localized, usually where skin contact is made with the latex product (Burton, 1997). Both of these minor allergic responses, Type IV and contact dermatitis, may evolve and progress to a Type I response with continued exposure to latex (Sussman & Gold, 1996).

Type I allergy, considered a true IgE-mediated response, produces generalized, systemic symptoms such as wheezing, rhinitis, and anaphylaxis (Sussman, Tarlo & Dolovich, 1991). These symptoms are caused by the binding of immunoglobulin E to mast cells in response to a sensitizing antigen, such as natural

rubber latex (FDA, 1998). As with other systemic allergic reactions, the symptoms can rapidly progress to collapse and even death.

In 1996, the American Academy of Allergy and Immunology published guidelines for the care of persons with latex allergy (Sussman & Gold, 1996). The Food and Drug Administration (FDA) recently released a Medical Alert advising healthcare workers to identify persons with latex allergy and to prepare a plan to care for these persons, either clients or employees (Food and Drug Administration, 1998). In June 1997, the National Institute for Occupational Safety and Health (NIOSH) released an alert recommending ways to protect workers from allergic reactions due to exposure to latex products in the workplace. At the state level, several state legislatures are currently considering laws to ban powdered gloves in healthcare settings. The scope of these activities by legislatures and governmental agencies register latex allergy as a public health issue.

Until 1996 very little research was accomplished on the prevalence of latex allergy in the general or healthcare population. Case studies were common in the literature but an assessment of the scope of the problem was not accomplished until recently.

In the discussion of latex allergy as a health care issue, one must consider the four major risk factors which research has indicated. Atopy, or the presence of environmental allergies, congenital neural defects, sensitivities to certain fruits, and exposure to natural rubber latex all play significant roles in the risk of developing latex allergy (Holzman, 1993).

The remainder of this chapter critically reviews the medical and nursing literature concerning the topic of latex allergy. Early writings present case studies identifying and describing IgE-mediated response to natural rubber latex. More recent research with larger samples acknowledge the wide scope of the issue in healthcare arenas and the atopic world in general. Studies investigating cross sensitivities with fruits and other foods and aeroallergens in relation to latex will also be discussed.

### Cross-sensitivities

Cross-sensitivity to specific fruits in a latex allergic patient is being recognized as a common co-occurrence. First described by M'Rahai et al. in 1991, the association has been clearly defined and widely accepted as a risk factor in latex allergy and a prevalent development, preceding or succeeding the identification of latex allergy (M'Raihi, Charpin, & Pons, 1991).

Two research studies investigating the manifestation of food cross sensitivities were reviewed. The first, a case study by Freeman (1997), describes a six-year-old Caucasian boy attending an allergy clinic with the complaint of allergy to banana and avocado. The second, a case control cross sectional study by Brehler, Theissen, Mohr and Luger, looked at latex allergic patients for cross sensitivities to certain fruits (1997). Both studies included RAST (radioimmunoassay) and skin prick test for fruits in the subjects and both found significant results.

As stated by the authors, the objectives of these studies were to describe subjects and their allergic symptoms to banana, avocado and latex. The unusual aspects of the case studies were the relatively young age of the child when allergic symptoms to latex developed and the seemingly nonatopic constitution. The child had

a positive radioimmunoassay to natural rubber latex, banana, avocado and chestnut, the three most common fruit cross-sensitivities. An unexpected finding in the study was the child's nonreaction to elastic containing clothing when they had been washed prior to wearing. The author devoted a large paragraph to this finding and suggested a hypothesis as to an explanation of this finding. One wonders why the researcher did not propose a follow-up study on this finding.

The case study type of nonexperimental research deems it nongeneralizable. It can, however, predict further reaction of this young subject to further exposure to latex and other fruits known to be cross-sensitive with natural rubber latex (NRL). With the in-depth approach used in this study, much understanding of the subject and his condition were gained. All information was either received by history or biophysiologic measurement which diminish the notion that the researcher did not report the data objectively. The researcher did not witness the allergic reactions. The conclusion of the study suggests that when one of the "dyad" of sensitivities to latex and fruit exist, sensitivity to the other should be sought.

There has been very limited research in the area of cross-sensitivity to fruits in a latex allergic individual. Most of the studies reported have occurred outside the United States as in the case of this report by Freeman. There is definitely a gap in the research in this area. Several studies of a general nature have looked at the cross-sensitivity issue but few have been devoted solely to the phenomenon.

An interesting outcome of the case control study by Brehler, et al. (1997), which utilized radioimmunoassay to diagnose hypersensitivity to latex, fruits and aeroallergens, was that serological tests have a low significance in the predictability

of food allergy in a latex allergic person. However, 55.9% of the subjects in this study reported food intolerance. As with latex allergy and other allergies, detailed history of symptoms and exposure often provides a more accurate diagnosis of sensitivity.

A strength of the study by Brehler, et al. (1997), originates in its case control design. Adding a control group to a study generally strengthens the design. However, the strength in this study exemplified its weakness as well. Although the study included a control group and the results of biophysiological measures were reported, correlation between the two groups was not reported in the article. Significance of the results of cross-sensitivity to fruits was also not reported in the article. Conclusions made by the authors include recommendations that all patients who are latex allergic carefully ingest fruits known to be potentially cross-sensitive. Cross-sensitivity may develop at any time. A particular consideration, which this author noted as very insightful, suggested that the latex allergic person should read labels to avoid foods where fruits are used as ingredients in ice cream, chewing gum, muesli, liqueurs, and juices. Enzymes found in fruits, such as papain, bromelain, and ficin, can also be found in processed foods and medications.

#### Latex Allergy in the Patient Perioperative Setting

Five studies which focus on the perioperative setting offer information of a very specific nature. While all five of the studies represent a perioperative issue, each concentrates on a slightly different question. In a report by Tan, Lear, Watts, Jones and English in 1997, a group of patients who suffered perioperative anaphylactoid reactions were investigated retrospectively. Admitting the limitation of their study due to the very small sample ( $n=27$ ), the authors note their results as statistically

significant for latex allergy. They summarized their conclusions to be the following: atopy is a predisposing factor in latex allergy; latex allergy can be a cause of intraoperative anaphylaxis; and all preoperative patients should be assessed for allergies, particularly to latex.

Two studies from France by Porri, Pradal, Lemièrre, Birnbaum, Mege, Lanteaume, Charpin and Vervloet (1997), looked at the perioperative setting from different viewpoints. A study of children published in Anesthesiology investigated the correlation between surgical experiences in children and the development of latex allergy. The use of a small control group ( $n=20$ ) strengthened the design but the sample of 80 children who were not randomly selected causes some concern about power. Latex sensitization was reported as 55% in the multiple surgery group. The researchers concluded that the avoidance of latex should begin with the very first surgical procedure in children. And because of the significant number of latex allergic children with previous surgery found in this report, the research group highly recommends preoperative screening for latex allergy in the pediatric child with previous surgery.

The subsequent study of adults by the same French research group found very different results in a group of adults screened for latex allergy (Porri, Lemièrre, Birnbaum, Guilloux, Lanteaume, Didelot, Vervloet, & Charpin, 1997a). In this study, they found a relationship between atopy, symptomatic latex glove use and positive radioimmunoassay or skin prick test. However, there was no significant relationship between previous surgery and latex sensitization. The convenience sample in this study ( $n=258$ ) answered a questionnaire about atopy and symptoms with latex

exposure followed by radioimmunoassay and skin prick test. The low rate of reported perioperative reactions to latex in the literature and the weak relationship to previous surgery and latex allergy led the researchers to reject their hypothesis that perioperative patients should be assessed for latex allergy. In fact, in the conclusion section of the report the researchers state that preoperative screening for latex allergy should not be recommended for adults.

From an occupational viewpoint, two studies performed in North America looked at latex allergy in the perioperative setting. The first by Brown, Schauble and Hamilton (1998) determined the prevalence of latex allergy among anesthesia staff. Utilizing a convenience sample of the nurse anesthetists and anesthesiologist at Johns Hopkins University Hospital ( $n=168$ ), this study employed a questionnaire, skin prick test, radioimmunoassay and, in some cases, a glove provocation test. The researchers identified risk factors for latex sensitization as history of food allergy, atopy and history of skin symptoms with latex glove use. Their study also measured a prevalence of 25.5% among the sample. They concluded that the risk factors of atopy, a history of fruit allergy, especially bananas, kiwi and avocado, and exposure to latex products high predisposed the anesthesia staff to develop a latex allergy. "These data support the need to transform the health-care environment into a latex-safe one that minimizes latex exposure to patients and hospital staff" (Brown, Schauble & Hamilton, 1998, p. 298). A strength in this research report was the planning by the authors to conduct a subsequent longitudinal study to follow the sensitized persons identified in the project. Reconfirming the skin prick test and radioimmunoassay tests

in individuals also determined the unlikelihood of test errors. This caliber of confirmation is seldom seen in studies such as the one cited here.

Mace, et. al. (1998) conducted an investigation of the prevalence of latex allergy in operating room nurses in a Canadian hospital. With a convenience sample of 247 operating room nurses, using a questionnaire and skin prick testing, the study revealed a prevalence among the nurses of 6.9%. These results, which are comparable to other studies, also indicated a finding of a troubling nature. Seventeen point six percent (17.6%) of the nurses surveyed reported no symptoms with latex contact, but had positive skin prick tests. The authors recommended that persons with high latex exposure be screened for latex sensitization routinely. As previously noted, repeated exposure to latex can induce more severe reactions, many of which could be prevented with proper screening. The study also supported the notion of cross sensitivity to foods in the latex allergic individual.

#### Prevalence of Latex Allergy- Occupationally Induced

Eight studies published between 1994 and 1997 investigated the prevalence of latex allergy in the healthcare worker and healthcare setting. Five of the studies, all of them cross-sectional, specifically examined the healthcare worker (HCW) as a correlate to the development of latex allergy. These five reported similar findings: the exposure to latex products in the occupational setting of healthcare workers put them at risk for developing latex allergy. The group of Kibby and Akl (1997) found significance in the association between atopy and latex allergy but no association between number or previous surgeries and latex allergy. Their survey ( $n=135$ ) concluded that eight percent of healthcare workers are sensitized to latex. Research



conducted by Liss, et al. (1997), with a very large sample of 1351 hospital workers, used a repeated measure design to determine prevalence and incidence of occupationally induced latex allergy. Their detailed description of research methods, included skin prick test and radioimmunoassay as well as a self-completed questionnaire, but admittedly may have been limited by selection bias. The researchers believe that since the participants were voluntarily selected, those with suspected latex allergy remained in the study possibly causing an overestimation of results.

Another large study ( $n=1472$ ), conducted in Hong Kong, projected an interesting hypothesis for further study (Leung, Ho, Chan, Choy and Lai, 1997). Because of a glove shortage in Hong Kong, gloves are washed and reesterilized, possibly reducing latex antigens in the gloves. Their study revealed a prevalence of 6.8%.

Douglas, Morton, Czarny and O'Hehir (1997) published a recent study conducted in Australia revealing a very large prevalence to latex allergy. Twenty-two percent of the nurses participating in this study tested positive by skin prick test to latex antigen. The authors reported a high correlation between atopy and latex allergy.

In a study in 1997 by Tarlo, Sussman and Holness, a cross sectional design involved the surveying and testing of 203 dental students and staff. Their findings of a 10% prevalence of latex allergy was determined by positive skin prick test. An interesting variable on the assessment tool involved the smoking status of the individual. This author has not seen this variable in a latex sensitivity study heretofore. However, the authors of the study reported no calculations or statistics

involving the smoking variable. Admitting the possibility of bias due to the skin prick testing of mostly symptomatic persons, positive skin prick test were related to positive atopic histories with the prevalence increasing through the four years of the dental students' education. Zero percent of the first and second year students escalated to a 10% prevalence in the fourth year students. This finding supports the work of other researchers who conclude that increasing and prolonged exposure to latex predisposes the individual to the development of a latex allergy.

The final report in this grouping of five prevalence studies, looked at emergency medical service personnel (Safadi, et al., 1996). A convenience sample of 93 persons attending an inservice completed a questionnaire, underwent skin prick test and radioimmunoassay with a 10% positive result. The research team noted an interesting conclusion that this population of healthcare workers has a very limited if unknown awareness of the occupational risk of latex allergy. A follow-up study of this type of healthcare worker group over time would be engaging to identify whether the knowledge base improved with the increased latex allergy knowledge among healthcare workers in general.

The remaining two prevalence studies reviewed used slightly different approaches from the previous studies cited in this paper. Brugnami, Marabini, Siracusa and Abbritti (1995), in Italy, report a case study of six hospital nurses who may have latex allergy associated with asthma with two control groups of ten and twelve hospital nurses.. This study was one of the first to investigate asthma as a correlate to latex allergy and concluded that chronic asthmatic reactions to latex could lead to permanent respiratory disability.

Swanson, Bubak, Hunt, Yunginger, Warner and Reed (1994) published a report that has become a classic study, often cited in the literature. With all the discussion surrounding latex allergy and the possible causes, this group evaluated the latex aeroallergens in the personal breathing space of healthcare workers as well as area work sites. With air samplers placed strategically in work areas and personal samplers carried by healthcare workers, the study revealed that latex allergen levels were significantly higher in areas where powdered latex gloves were worn and changed. The group concluded that exposure to latex aeroallergens can be controlled by limiting the use of powdered latex gloves.

### Conclusion

A review of the classic and oft-cited research and recent published studies concerning latex allergy as an occupational risk reveals significant evidence and similar conclusions. All of the studies reviewed show a relationship between latex allergy and atopy or suggest that atopy is associated with latex allergy and should be considered a risk factor for the development of latex sensitization. Healthcare workers have a high prevalence (6.8% to 22%) of latex allergy and should limit their exposure by whatever means are available. The use of non-powdered or non-latex gloves is recommended in several of the studies and could prevent the development of chronic and permanent asthmatic disability.

### Chapter III

#### Methodology

The purpose of this descriptive study was to determine the prevalence of latex sensitivity in the employee population at a mid-Atlantic medical center using a self-report survey. Symptoms from direct contact with latex products present only a fraction of the exposure possibilities. Studies show that the latex antigen becomes aerosolized due to the leaching of latex into glove powder that becomes airborne. Allergic respiratory symptoms such as rhinoconjunctivitis and asthma can be the sequelae from this airborne latex aeroallergen (Warshaw, 1998). Prevalence studies are appearing in the literature with increasing frequency. Many populations are the subjects of these studies, from a specific medical practice to an entire staff of a large hospital.

#### Hypotheses

Prevalence studies typically do not require hypotheses unless one wishes to predict the outcome of the study. However, studies and reports concerning risk factors for the development of a latex sensitization have dominated the literature in recent years. The study discussed in this paper included the collection of data that targeted these identified risk factors. Therefore, the following hypotheses were tested and analyzed regarding the correlation of variables as discussed in the literature.

1. There is a direct relationship between occupational exposure to latex and the symptoms of latex sensitivity.
2. There is a direct relationship between atopy and symptoms of latex sensitivity.

3. There is a direct relationship between reported food allergy and symptoms of latex sensitivity.
4. There is a direct relationship between number of surgeries and symptoms of latex sensitivity.

### Theoretical Framework

Neuman's Systems Model lends itself well to latex allergy with its two major components of stress and the reaction to stress. The stress involved in latex allergy can involve latex proteins, amount of exposure to latex, as well as skin breakdown. The nurse in Neuman's model is seen "as an intervener whose goal is either to reduce the client's encounter with certain stressors or to mitigate his/her perceived effect through implementation of appropriate interventions within the three levels of prevention" (Neuman, 1989, p. 201).

A prevalence study falls into the Primary Prevention segment of Neuman's model where high-risk employees are identified as they react to the stress of latex exposure in their occupational environment. The model continues to explain that the nurse's role is to "provide information to maintain or to strengthen existing client system strengths" and to educate (Neuman, 1982, p.19). This research study identified employees at risk for developing latex sensitivity through primary prevention and employees presently sensitized to natural rubber latex. Secondary prevention can then be implemented as a follow-up to the study on the part of the healthcare institution for the latex sensitive employees. Providing protection for the latex sensitized employee should be a responsibility of the employer concerned for the wellbeing of its workers.

## Objectives

The objectives for this study were to explore the prevalence and correlates with risk factors of latex sensitization among employees of a rural acute care hospital and to gather information to assist the institution in providing a safer working environment.

## Theoretical Definitions

**Prevalence** is “the measure of the number of cases of a given disease in a specified population at a designated time” (Valanis, 1992, p. 431). In this study, the determination of the disease of latex sensitivity will be by the manifestation of symptoms to latex exposure.

**Correlation** is “the tendency for variation in one variable to be related to variation in another variable” (Pollitt & Hungler, 1997, p. 638).

“**Sensitization** is the development of immunological memory by exposure to a given antigen” (Beezhold & Sussman, 1997, p.38). Although the definition of sensitization varies throughout the literature, for this study **sensitization** refers to physical responses to a latex product, including chapped hands, rhinitis, itching, wheezing, redness, swelling or hives (Young, 1998; Gritter, 1998).

A **minimal latex facility** refers to an institution that has striven to eliminate latex products from its environment. Because of this massive undertaking due to the myriad of products made up of latex, healthcare institutions can only boast that it is a “minimal latex” facility rather than be assured that it is indeed latex free.

**Minimal risk** refers to an employee who is not occupationally exposed to latex, nor possesses any of the additional risk factors of atopy, history of surgery, neural defect or cross-sensitivity to determined foods.

**An employee at risk** refers to an employee who is occupationally exposed to latex and/or possesses any of the additional risk factors of atopy, history of surgery, neural defect or cross-sensitivity to determined foods.

**Atopy** refers to the presence of symptoms to environmental allergens.

**Symptoms of latex sensitivity** refers to symptoms of an allergic response, such as, rhinitis, conjunctivitis, wheezing, erythema, angioedema, and anaphylaxis.

**Reported food allergy** refers to items on the self assessment survey tool utilized in this study which seek to determine a person's physical reaction to ingested foods.

**Occupation exposure to latex** refers to an encounter with a latex product by an employee within the realm of their job at the mid-Atlantic medical center.

#### Operational Definition

Prevalence of latex sensitivity as determined by a survey assessment tool and reported as a percentage of the employee population.

Risk factors determined by questionnaire responses which reported self-identified risk factors related to the prevalence within the population surveyed as well as to other populations in the research.

#### Research Design

The design for this study was a cross-sectional epidemiological prevalence survey study. An assessment tool, developed by this author and pilot tested, was

utilized for the survey. Within a three week period all employees of a rural mid-Atlantic medical center were invited to participate in the completion of an assessment tool. There was no advertisement for participants. It was anticipated that workers with symptoms of latex sensitivity would be more likely to participate in the study, thus affecting the outcome and resulting in a sampling bias. Participation was voluntary.

### Research Methods

The assessment tool (see Appendix C) was designed by this researcher from a compilation of the questions posed in the review of the research literature. It was reviewed for content validity by graduate faculty at Salisbury State University.

After approval by the hospital Institutional Review Board and the Committee for Human Research at Salisbury State University, a pilot study using the employees of a free standing dialysis unit in a local community was conducted to test the assessment tool. (See letters of approval, Appendixes D and E). The surveys were returned from the dialysis unit with no missing data and clearly documented data.

Cooperation was then requested of all department managers of the participating medical center. They were asked to communicate with their respective staff to anticipate a questionnaire on their personal exposure to latex products. Their participation was voluntary. All employees associated with the hospital have participated in a mandatory latex allergy educational offering since December 1997 and thus have familiarity with the subject.

The researcher delivered copies of the survey to the department director or manager who distributed the survey on the unit to each employee. The accompanying cover letter to the director or manager implored them not to coerce or obligate their



employees to participate in any way. In the information and consent form, all employees were asked to complete the survey during their regular assigned shift and to return it in the sealed, "research" envelope to a designated site. Completed surveys were returned by the participants in a sealed envelope (marked "research") to a designated place on each unit. The researcher was responsible for retrieving the completed surveys for data reduction and analysis. Although two weeks were allocated for completion of the surveys, many of the managers returned the large sealed research envelope through interoffice mail prior to that completion date.

In the study, employees voluntarily participated by completing a survey. The survey was coded to identify an employee's work area only. In this way, specific work areas could be identified as high/low risk based on the results of the survey. To facilitate confidentiality, no individual identifying coding was used. Further, the completed survey was returned in a sealed generic envelope marked "research" that was provided by the researcher. Data as compiled from the questionnaire were stored on floppy diskette and protected by the researcher. Only aggregate data was reported and shared with the institution.

Employees who volunteered were also given the freedom to refuse to answer any item on the survey. While the survey was anonymous and no specific identifying codes for individuals were used, participants may have felt some questions pointed to their identity (for example, information about having a congenital defect). It should be noted that this same information is likely to be on record with the Human Resources department of the hospital. Individuals were informed that they could choose not to participate or to leave any question unanswered. In addition, all

participants were assured that the information obtained would not be used against them in any way.

## Sample

### Definition of target population

The target population in the study was employees of a rural acute care hospital who have occupational exposure to natural rubber latex products and who volunteered to participate in the study ( $n=1056$ ). This sample ( $n=379$ ) was comprised of volunteers. It was anticipated that some employees would refuse to participate, leaving the researcher with a convenience sample.

### Sample characteristics and Size

Demographics including gender, age, job category within the hospital, age, and work location was gathered on the survey form for the purpose of describing the sample. The tool used to gather this information appears in Appendix A.

All of the nearly 1290 employees of the medical center were asked to participate in the study because of their occupational exposure to latex. The employee population number as reported by the Human Resource Department translated into 1056 employees as reported by managers of individual departments. The discrepancy in numbers could refer to casual and seasonal employees who were not present during the survey. An adequate sample size was obtained with the large employee population of the healthcare facility. The assessment tool was designed to gather information about 13 variables. According to Polit and Hungler (1995, p. 243), 20 to 30 subjects should be surveyed for each variable. As such, the project should

minimally include a sample size of 260 subjects. The survey resulted in 379 returned assessment tools or 35.7% of the tools distributed.

### Data Analysis

Because the data collected was nominal level, nonparametric statistics were necessary for data analysis. To compare findings to the findings of studies of other populations, the SPSS calculation of Chi square was used.

### Assumptions and Limitations

This study was nongeneralizable, with results applicable only to the convenience sample. Although confidentiality was protected, employees may have been concerned that the information obtained through the survey be used to jeopardize their employment position. It should be noted that no such concerns were verbalized to the researcher verbally, in writing or by comments written on the survey tool.

### Ethical Implications

This author presented the study proposal to the Chair Bioethics/Institutional Review Board of the hospital for approval to conduct the study. Unanimous approval ensued. The Salisbury State University Committee on Human Research considered the study exempt for involving risk to the study individuals. All participants were assured that the information obtained would not be used against them in any way. They were also given the freedom to refuse to participate. Their identity was anonymous to the researcher and to others and measures were taken to protect their confidentiality. No physical harm came to any of the participants as a result of participating in the study and only five to ten minutes of their time was required to

complete the assessment tool. The only possible risk associated with the survey was any emotional stress experienced as a result of answering questions related to their physical health history.

### Conclusion

Latex allergy as an occupational risk has been documented in the literature for nearly a decade. With recent warnings and regulations issued by United States government agencies, such as the Food and Drug Administration and the National Institute of Occupational Safety and Health, healthcare facilities are faced with the reality that they must provide a safe environment for employees as well as clients. Without a knowledge base to reveal the significance of latex allergy at the medical center, it is difficult to set short and long term goals and to strive toward becoming a “minimal latex” facility. Providing the assessment of the employee population as a service to the institution was one goal of this project and an important step toward understanding the seriousness of the issue.

The results of the survey appear in Chapter IV. They are organized by the study hypotheses.

### Chapter IV

This study investigated the employee population of a rural mid-Atlantic medical center for the prevalence of latex sensitivity. Using a cross-sectional design and an assessment tool developed by the author, the sample from the population completed a self-reported survey in February, 1999. Hypotheses concerning the risk factors for the development of latex allergy as documented in the literature were developed and tested.

#### Demographics of the Sample

Distribution of the assessment tool for the survey project was based on numbers of staff persons per unit as reported by unit managers. The number of surveys distributed totaled 1056 with a return of 379, or 35.9% of the surveys distributed. The mean age of the persons responding was 41.64 with a standard deviation of 11.65 and a range of 51 years. Tables 1 and 2 illustrate the distribution of roles and gender within the sample.

*Table 1* Distribution of Role Within the Sample

<i>Role</i>	<i>Frequency</i>	<i>Percent</i>
RN	123	34.8
LPN	6	1.7
NA	31	8.8
Lab Tech	7	2.0
Non Clinical	10	2.8
Other	176	49.9

*Table 2* Distribution of Gender Within the Sample

<i>Gender</i>	<i>Frequency</i>	<i>Percentage</i>
Female	282	83.2
Male	57	16.8

### Hypotheses

#### Hypothesis 1

There is a direct relationship between occupational exposure to latex and the symptoms of latex sensitivity.

Persons commonly do not recognize the association between latex products and the symptoms of a latex sensitivity. Therefore, this researcher reviewed the data to determine the prevalence of persons "at risk" for developing a latex sensitivity. Much research has been documented in the literature to recognize atopy, surgery, exposure to latex and food allergy as risk factors related to the development of latex sensitivity. From the survey, 63.5 % of the sample that reported occupational exposure to latex also possess an additional risk factor of history of surgery, atopy or food allergy. An Chi-square test was conducted between occupational exposure to latex and the risk factors of surgery, atopy and food allergy and was not found to be significant at the .05 level..

A Chi-square test was performed to determine an association between occupational exposure and reported specific symptoms when handling latex products. These symptoms failed to be associated to occupational exposure. Positive responses

to the question concerning specific symptoms when handling latex products totaled 27.8 % of the sample.

A Chi-square test was performed between occupational exposure and reactions to specific latex products. Association was not significant at the 0.05 level.. Of those responding to the question concerning reactions to latex products, 21.8 % responded 'yes.'

Because non-clinical staff outnumber clinical employees 154 to 218, it was decided to look at a subset of clinical employees and these same variables. Table 3 illustrates the statistical association in this employee subset. None of the associations approached significance at the 0.05 level.

*Table 3* Variables Within the Clinical Employee Subset

<i>Variables</i>	<i>N</i>	<i>Value</i>	<i>Df</i>	<i>P</i>
Occupational exposure vs. reaction to specific latex products	200	.757	1	.306
Occupational exposure vs. specific symptoms to latex products	198	.657	1	.302

Reviewing the data in regard to percentages of the sample reporting specific symptoms and risk factors shows a dramatic difference between the clinical and nonclinical subset. Table 4 illustrates these differences.

*Table 4 Occupational Exposure and Latex Reaction Within Employee Subsets*

	<i>Clinical</i>		<i>Nonclinical</i>	
	Reaction to latex	No reaction to latex	Reaction to latex	No reaction to latex
Occup expos	95.2%	88.6%	21.2%	39.8%
No occup expos	4.8%	33.3%	78.8%	60.2%

In the nonclinical subset significance was found between occupational exposure and reaction to specific latex products,  $\chi^2(1, N = 141) = 3.822, (p = .038)$ .

The survey included questions relating to the specific latex products to which employees were exposed. Table 5 illustrates the products to which employees reported reactive symptoms.

*Table 5 Frequency of Reactions to Latex Products*

<i>Product</i>	<i>Frequency</i>	<i>Percent</i>
Balloons	6	1.7
Gloves	43	11.7
Adhesive Tape	45	12.5
Ace Bandage	6	1.7
Elastic	28	7.8
Condoms	15	4.2
Band-aids	34	9.4
<i>Total</i>	177	49.0



If persons are occupationally exposed to latex products, what are the exhibited symptoms? Symptoms of reaction to latex products vary widely. Table 5 illustrates the symptoms reported by respondents to the survey.

*Table 6* Frequency of Symptoms When Handling Latex Products

<i>Symptom</i>	<i>Frequency</i>	<i>Percentage</i>
Chapped Hands	89	24.9
Rhinitis	23	9.0
Itching	58	16.4
Wheezing	4	1.2
Redness	60	16.9
Swelling	17	4.9

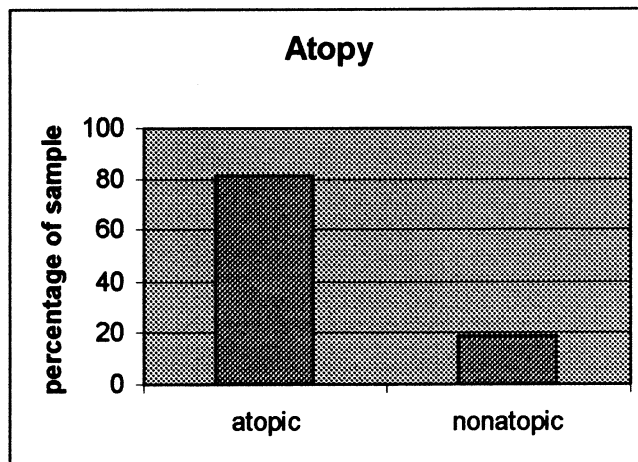
In summary, the hypothesis that there is a direct relationship between exposure to latex products and the symptoms of latex sensitivity was supported by this data.

### Hypothesis 2

There is a direct relationship between atopy and the symptoms of latex sensitivity.

Atopy was determined by reports of the following conditions: contact dermatitis, rhinitis or conjunctivitis, hay fever, eczema or asthma. Atopy, as shown in Figure 1, presented in 81.4 % of the sample population.

*Figure 1* Atopic Versus Non-atopic Employees in the Sample Population



Persons determined to be atopic by report of the previously described conditions were associated with persons who reported specific symptoms when exposed to latex products. Association by Chi-square resulted in significance,  $\chi^2(1, N = 323) = 22.514, (p=.000)$ .

Reviewing the data as noted in the clinical employee subset, significance was found in the relationship between atopy and specific symptoms when exposed to latex products,  $\chi^2(1, N = 138) = 15.059, (p=.000)$ .

A significant relationship was determined between atopy and specific symptoms to latex products in the nonclinical subset as well,  $\chi^2(1, N = 125) = 5.686, (p=.018)$ . In addition, a relationship was significant between the variables of atopy and latex reaction to specific latex products in this subset,  $\chi^2(1, N = 135) = 13.284, (p=.000)$ .

### Hypothesis 3

There is a direct relationship between reported food allergy and symptoms of latex sensitivity.

Employees were asked to respond to questions identifying specific foods as reported in the literature to have common cross-sensitivity to the latex allergen. Over fifteen percent (15.8 %) of the sample population reported an allergy to a food product ( $N = 59$ ). Allergy to specific foods included all foods listed on the survey with many reported under the category of 'other.' See Appendix A.

Association by chi-square indicated significance between food allergy and reported symptoms to latex products,  $\chi^2(1, N = 51) = 16.061$ , ( $p < .001$ ). Association by chi-square also indicated significance between food allergy and reported reaction to specific latex products,  $\chi^2(1, N = 345) = 10.064$ , ( $p = .002$ ), supporting the position that there is a relationship between reported food allergy and reported symptoms when handling latex products.

Comparing the clinical employee subset to the above Chi-square results, significance was not found in the variables of food allergy and reported reaction to latex products,  $\chi^2(1, N = 198) = 1.551$ , ( $p = .157$ ). However, a significant relationship was found between food allergy and specific symptoms to latex products,  $\chi^2(1, N = 196) = 7.292$ , ( $p = .008$ ), showing that persons who reported food allergies may be at risk of developing a latex sensitivity.

In the nonclinical subset significant association was determined between the variables of food allergy and reaction to specific latex products,  $\chi^2(1, N = 140) = 10.305$ , ( $p = .003$ ). In addition, there was statistical significance in the relationship between food allergy and specific symptoms to latex products.  $\chi^2(1, N = 135) = 8.090$ , ( $p = .008$ ), indicating that food allergy may be a risk factor in the development of a latex sensitivity.

In summary, the hypothesis test that there is a direct relationship between reported food allergy and the symptoms of latex sensitivity is supported by the data in this study.

#### Hypothesis 4

There is a direct relationship between number of surgeries and symptoms of latex sensitivity.

Table 7 illustrates the frequency of surgery as reported by the sample population.

*Table 7* Frequencies of Surgery

	<i>Frequency</i>	<i>Percent</i>
0 surgeries	5	1.7
1-3 surgeries	221	73.9
≥ 4 surgeries	73	24.4
<i>Total persons with + history of surgery</i>	294	98.3

As illustrated in Table 7, 98.3% of the sample reported a history of previous surgery. Number of surgeries was related to symptoms to latex products. Pearson Chi-square was not significant to the 0.05 level. Number of surgeries was associated with reaction as reported by latex product. Chi-square was not significant at the 0.05 level. Thus we would conclude that there is no relationship between previous surgery and the development of a latex sensitivity.

Data were then recoded as to history of surgery or no history of surgery. No association was found between history of surgery and specific symptoms to latex products. By Chi-square test, no significant association was found between history of surgery and reactions to specific latex products.

Within the clinical employee subset, previous surgery was tested for association with reaction as reported by latex product. Chi-square was not significant at the 0.05 level.

Previous surgery was not associated with reaction to specific latex products in the nonclinical subset. Specific symptoms to latex products did not product significance in this subset when compared to previous surgery.

All of the variables of atopy, previous surgery, food allergy and occupational exposure to latex products were investigated within the employee subsets. Appendix B illustrates by percentage the differences between the subsets of clinical and nonclinical employees through all the variables described in this paper.

### Prevalence

The primary goal for this research study was to determine the prevalence rate of the employee population of a mid-Atlantic medical center. Responses to the question, "Have you ever been told by a doctor that you have an allergy to a latex product?" resulted in a frequency of 12 representing 3.2% of the sample population. Of these 12 respondents, three were registered nurses, one was a certified nursing assistant and eight were non-clinical staff.

## Chapter V

### Summary and Discussion of Findings

This cross sectional prevalence study, involving a mid-Atlantic rural medical center, produced a large data set that provided very interesting conclusions. Hypotheses were proposed suggesting direct relationships between known risk factors, as documented in the literature, for the development of latex sensitivity.

These hypotheses concerned the risk factors of atopy, food allergy, history of surgery, and occupational exposure to latex. Upon analysis of the data, it was concluded that relationships exist between the variables and data suggested several unanticipated outcomes. The hypotheses proposing relationships between symptoms of latex sensitivity and the variables of atopy, food allergy and occupational exposure to latex were supported.

The sample of 379 employees was initially evaluated as a whole and then was divided into two subsets of clinical employees and nonclinical employees. Because approximately 57% of the sample were employed in clinical areas, it was anticipated that significance would be found in a Chi-square test of each of the variables as described in the literature. Therefore, the nonsignificant findings within the clinical subset were intriguing.

A finding that was significant for the entire sample as well as the clinical and nonclinical subsets, was an association between the variable of atopy and specific symptoms to latex products. In addition, a significant relationship was found between the variables of food allergy and specific symptoms to latex products in the entire sample, as well as the clinical and nonclinical subsets. As reported in the literature (Kibby & Akl,

1997, Leung, Ho, Choy & Lai, 1997), strong associations have been found in similar samples of health care workers between atopy, food allergy and symptoms to latex products. Therefore, these findings were anticipated. The hypotheses suggesting a direct relationship between atopy and the symptoms of latex sensitivity and a direct relationship between food allergy and the symptoms of latex sensitivity were supported.

Studies by Watts, Jacobs, Forrester and Bartolucci (1998), Turjanmaa (1987), and Artelano, et al. (1992) support the notion that the risk of latex sensitivity in the atopic person far exceeds that in the nonatopic person. Although the specific pathophysiologic reason for allergic responses is not entirely clear, it is known that responses to multiple allergens can and do occur in atopic individuals (Solomon, 1992). Therefore, for atopic persons to present with allergic symptoms to a latex product, a known allergen, is not considered unexpected or exceptional.

The physiological response of food allergy is similar to the response to environmental allergens. However, a recent finding adds an additional dimension to the notion of food and latex sensitivities. Work by Mikkola, et al. (1989) concluded that “the proteins structurally and immunologically resembling hevein, a major NRL [natural rubber latex] allergen, exist in banana and bind IgE from sera of patients allergic to latex” (p. 1010). Similarly, the epitopes in chestnuts and avocados resemble the epitopes of latex (Mikkola, et al., 1998). Therefore, to see an association between latex sensitivity in the person with food allergy, especially to banana, avocado and chestnut, would not be remarkable.

Another significant finding in this study related to occupational exposure to latex products and the development of symptoms of a sensitivity to those products. Chi-square

tests for the entire sample indicated a significant association. However, in the clinical and nonclinical subsets, significance was not found. This was a totally unexpected finding and cannot be explained through the literature or in relation to the other findings of this study. One wonders if the respondents minimized their symptoms to latex products or chose to reply inaccurately by not reporting symptoms at all. This could be explained by fear of loss of job and/or denial on their part to a physically occurring phenomenon. Assurance of confidentiality and anonymity was clearly stated in the cover letter attached to the survey. But, for those unaccustomed to the utilization of research, suspicion that their answers could be reported to the medical center administration may have occurred.

This study of a rural mid-Atlantic medical center revealed a 3.2% prevalence of latex allergy diagnosed by a physician, based on reports of the participants. Many persons do not recognize their symptoms as responses to latex products or as a possible latex sensitivity. Therefore, prevalence was also determined by the percentage of the sample that reported physical symptoms to latex products.

Questions on the survey referred to specific symptoms such as dermatitis, wheezing, or itching when handling latex products. In response to these questions, 25.1% of the sample reported specific symptoms. Another item on the survey listed many latex products and asked respondents to indicate if they have ever experienced any reaction when handling these products. Of those responding to this item, 20.1% reported reactions to latex products. Due to the nature of this study, the prevalence of latex sensitivity within the employee population of this mid-Atlantic medical center was considered to be 25.1%. However, it is important to note that there were no



biophysiological measures employed in this study. Such measures would have provided better measurement of sensitivity.

Nursing is considered a holistic profession. The holistic, wellness-oriented Neuman Systems Model lends itself to the study of occupational risks within the healthcare arena. Through the caring of others (clients), healthcare workers constantly place themselves at risk. The hazards in healthcare are many. Exposure to blood and body fluids, hepatitis, AIDS and other diseases, inhalation of expired gases in post anesthesia areas, punctures from needles and other sharps and many other hazards await the healthcare worker on a daily basis. To protect against such risks, precautionary wearing of barrier eye wear, clothing, masks and gloves have been instituted. Many of these products contain latex. The exposure to latex itself has become a hazard for health care workers. As research moves toward identifying these perils and developing plans to protect nurses, physicians and other health care workers, awareness must be increased and consciousness raised to the hazard of latex.

Because of these risks from exposure to latex products, the health care worker often becomes the client. As the client moves and functions within the 'related environment', another concept described in the model, he or she reacts to stressors within that environment (Neuman, 1989). Latex, or more specifically the risk of developing a sensitization to latex, subtly or dramatically can become one of these stressors. Using the Neuman model, primary, secondary and tertiary prevention for the development of a latex sensitization, can return the health care worker to an improved state of wellness or provide tools to maintain that state of wellness.

In this study, the identification of latex exposure (stressor) as an occupational risk to the target population (health care workers) indicates primary prevention. Bringing the results of this study to the administration of the mid-Atlantic rural medical center may lead to secondary prevention, as the institution seeks to protect those who have become sensitized to latex. Those employees who have become sensitized and find it difficult to function in a latex-laden environment, will benefit from tertiary prevention. This approach will provide rehabilitation for those affected through respiratory care and the acquisition of a latex-safe working environment. This study supports Neuman's model, especially in relationship to primary, secondary, and tertiary prevention.

Constraints of the design of this study prohibited the inclusion of biophysiological measurements. The obvious succession to this study would be a similar design, using both a questionnaire survey tool and a skin prick test and possibly, serum latex-specific IgE. The inclusion of biophysiological measures in research studies varies within the literature. Some researchers tested those who responded positively to survey questions concerning symptoms to latex products. Other studies tested all persons giving permission within the sample. The addition of objective assessment tools such as these decrease the limitation of the self-report. Clearly, skin prick test and serum analyses add strength and validity to studies using self-reported questionnaires. "The use of a questionnaire to identify these conditions, [contact dermatitis, hives, atopic eczema, family history of allergies] along with an objective measure of atopy such as skin test, may aid in identifying those workers at risk for latex sensitization and who should take precautions to prevent frequent exposure to latex-containing products" (Watts, Jacobs, Forrester & Bartolucci, 1998, p. 36). In an investigation by Safadi, et al. (1996), the

authors found positive skin prick test present in only 10% of those in the sample that reported symptoms from latex exposure. The use of skin prick test or serum analysis could provide a more accurate determination of latex sensitivity or atopy to environmental allergens within a study sample.

Another consideration that may have influenced the results of this study is that the hospital involved in this study banned powdered exam gloves one year prior to this survey. Results of the survey may have been impacted by that ban. A longitudinal study of the sample population, as further restrictions are imposed by recommendation of the latex allergy task force, could result in a different data set. Research shows that elimination of, or limited exposure to, latex products can reduce symptoms in those persons sensitized. Allmers, et al. (1998), in research conducted in Germany, found that two (N=7) latex sensitized health care workers in their sample were able to discontinue their asthma medications when powdered gloves were removed from their unit.

A suggestion for further study could be an investigation limited to those respondents who reported symptoms to latex products. Brown, Schauble and Hamilton (1998) concluded that their research would have been strengthened by follow-up study of those persons who have no current clinical symptoms to latex products but test positive to skin prick test and serology. This is related to the notion that these persons are in the early stages of sensitization. Further progression of the disease could possibly be prevented with avoidance of latex exposure. This may also be the case with individuals in this study.

This study was simple in design and methodology. Suggestions for further research include expanding the design and methods. Surveying the employees of multiple

sites within a geographical region may yield interesting results. Replicating the study in a larger institution with similar practices could also be accomplished and compared to this study. Because latex is ubiquitous in our world, effecting the study in a non-health care facility may prove informative.

Due to the seriousness of the latex sensitivity issue, the National Institute of Occupational Safety and Health (NIOSH) issued a NIOSH alert in June 1997. In this document the following statement is found on page 2: "Latex allergy can be prevented only as employees adopt policies to protect workers from undue latex exposures. NIOSH recommends that employers take...steps to protect workers from latex exposure and allergy in the workplace." The administration of this mid-Atlantic medical center will be encouraged to take steps to limit latex exposure to reducing the number of latex products in the hospital and by encouraging practitioners to wear only nonpowdered latex gloves for procedures and surgery. It is suggested that further investigation is warranted using biophysiological measurements within this target population.

Identifying risks and hazards within the healthcare setting, in an effort to provide a safe and protective environment, can only bring strength to an institution and confidence in its employment. As a "clinical expert", the nurse must possess knowledge of government standards, policies, codes and laws and how to implement them within the health care setting. The setting of the current study is neither an academic milieu nor a teaching hospital. Because of this milieu, research and the utilization of research is sadly lacking. Many perioperative nurses have witnessed unexplained anaphylaxis in their practice. Latex allergy may have been the causative factor in the client's collapse. Screening clients before surgery should become a routine practice.

Many opportunities, such as the implementation of this prevalence study, exist for the incorporation of research into the environment and the advancement of knowledge through research. Research needs to continue in the area of latex sensitivity. The recent discoveries of cross-sensitivity in food allergy to latex allergy require further research. In the future, latex allergy may be predictable based on the identification of antigens within the sera of individuals long before symptoms appear. The study at hand, as well as several other studies, did not support the hypothesis that a relationship exists between previous surgery and the development of latex sensitivity. However, because some studies have suggested this relationship, further research is obligatory.

The advancement of professionalism within nursing is a worthy goal for the nurse researcher. "A profession seeking to enhance its professional stature strives for the continual development of a scientific body of knowledge fundamental to its practice. The emergence of such a body of scientific knowledge can be instrumental in fostering a commitment and accountability to the profession's clientele" (Polit & Hungler, 1995, p.3). We, as nurses, must work together to promote our profession by the institution of research and the utilization of that research in our practice. Research informs our practice and provides opportunities for improving patient outcomes (Granger & Chulay, 1999).

The economic impact when limitations to latex exposure are instituted could be costly. Most nonlatex products carry a considerably higher price tag than their latex equivalents. For instance, latex non-sterile gloves can cost from \$.30 to \$.35 per pair, while their vinyl substitute can cost \$1.75 to \$2.25 per pair (Weinert, 1998). For a 100-bed hospital, the difference in cost between the two choices of gloves can be over two million dollars annually based on 100,000 pairs per month used (Weinert, 1998).

However, if health care workers become disabled due to their latex sensitivity, the cost to the self-insured institution could exceed the figure for the replacement of gloves alone. Remediation, through an environmental cleansing of latex antigens, and replacement of latex products, though initially expensive, would be cost effective in the end. Cost saving measures are an important factor in any healthcare environment. However, we would like to believe that healthcare institutions, which are in the business of caring for clients, would care enough about their employees to forego any perceived notions about increased cost and provide a safe working environment.

This study, as it examines the risk factors associated with the development of latex sensitivity within a rural mid-Atlantic medical center, provides the knowledge upon which to implement new policies for occupational safety. Over one year ago, the hospital eliminated powdered exam gloves in an effort to reduce the level of latex aeroallergens, thus limiting latex exposure. This policy was an important one and laid the foundation for additional policies. However, powdered sterile gloves continue to be used in procedure areas and surgery. The elimination of these sterile gloves could improve the aeroallergen level even further. Replacing commonly used latex products, such as catheters and tourniquets with nonlatex alternatives, would also limit latex exposure. Buying products such as these, because of their high volume usage, could possibly be cost effective over stocking both latex and nonlatex products.

As with any new issue, education must be a key component to improvement. The medical center, though initially requiring latex allergy education annually, now offers that education for new employees only. Misconceptions and misinterpretation of information still exist among the staff as evidenced with this author. A recommendation

to reinstitute the educational offering as an annual event will be an outcome of this study. Many employees are at risk. Their knowledge deficit could cause them harm.

Education is the essential factor in most nursing and health care issues. Latex sensitivity is no exception. Unless we, as health care providers, are aware of the latex within our environment and the environment of our clients, we will have difficulty protecting our clients and ourselves.

#### Limitation of the Study

The utilization of a self-report questionnaire limits the validity and accuracy of the data. Although researchers would prefer to believe that respondents have completed the questionnaire honestly, the possibility exists that this may be a false assumption. As social beings, persons may prefer to respond as they would like to be viewed and considered, not as they truly are. A cover letter attached to the assured the confidentiality and anonymity of the survey. However, distrust may exist and influence the responses given. Biophysiological measures would greatly enhance and validate the data set due to their objectivity and precision.

The questionnaire, as designed by this author, may have caused difficulty for respondents. In the demographic section at the top of the survey, respondents were asked to place a check next to the role designation which best described their employee role. An extra blank was inserted erroneously which confused the answers to this question. Six roles were listed and seven blanks were provided. This typographical error made determination of the role difficult to decipher in several cases. In most cases determination was possible due to the coding of the questionnaire by hospital unit. For

instance, there are no nursing assistants employed in the laboratory. Therefore, a designation of lab tech was determined and the data coded appropriately.

Many employees who are clinicians currently are employed in nonclinical areas. Therefore, their occupational exposure to latex at this time could be nonexistent. In retrospect, adding a question to ask respondents if they currently work in a clinical or nonclinical setting would have enhanced and improved data analysis.

In the food allergy section on the survey, respondents were asked to relate whether their food allergy was of recent onset or longstanding. There is little mention in the literature of this variable and therefore, it could have been eliminated from the survey. It served little value as the data were analyzed.

Collection of the survey proved to be more difficult than originally anticipated. Department managers were instructed in writing to return the completed surveys by interoffice mail or wait for the author to gather them. On the day designated as the gathering day very few managers were found in their offices. Therefore, several e-mail messages were required asking them to return the surveys via interoffice mail. Even with two global e-mail reminders and several personal requests from the author, the surveys from at least two departments were never found. Some confusion about how the surveys were to be gathered was evident.

#### Strengths of the Study

Before data collection commenced, a pilot study was conducted in a small outpatient renal dialysis unit to evaluate the format and content of the survey itself. Respondents completed the survey clearly and, seemingly, without confusion. The responses seemed appropriate and the dialysis staff offered no comments for



improvements in the survey. Responses included persons with food allergies, atopy, and symptoms to latex products. One of the seven respondents had been diagnosed by a physician with a latex allergy. With responses such as these in such a small sample, the researcher was indeed optimistic that significant outcomes would be found in the full study.

The phenomenon of latex allergy has been widely publicized in lay and professional medical and nursing media for several years. Consequently, health care workers are becoming more aware of the issue and seek protection and comfort for their occupational safety. Therefore, the timing of this study was appropriate and necessary.

Members of this mid-Atlantic rural medical center's latex allergy task force that was the site of this study met with much resistance to efforts aimed at minimizing latex exposure for the employees and to implement a latex safe protocol for the patients with a known latex allergy. Physicians also showed little concern for the issue and some refused to comply to the request of the task force that the use of powdered latex gloves be minimized. These issues prompted this author to pursue the project at hand in an effort to raise the consciousness of the administration and medical staff concerning latex allergy.

Many survey respondents wrote comments and concerns on the returned survey form for the author's perusal. Some shared stories of despair and fear as they notice an increase in their symptoms to latex products but discern very little concern from the hospital, as an institution, to their plight. It was obvious from these written comments and spoken conversations with employees that there was gratitude for the timeliness of the project. Overall, this researcher sensed a general willingness on the part of to participate in the study and an appreciation for the attention to this important issue.

The literature surrounding the issue of occupational exposure to latex strongly supports avoidance of latex products for the health care worker. The risk factors of atopy, food allergy, and history of surgery are upheld as contributing to the development of a sensitization to latex in clients and health care workers. Providing a latex-safe environment for all that enter the health care system can dramatically decrease the risk of impairment and complications. What began as a protection for the health care workers through the institution of Universal Precautions has become a field of concern and often terror. While the superior properties of latex provide protection for nurses and other health care workers, many lives have been devastated by the threat of loss of career or endangerment of health and wholeness. The health care area should provide safety and a refuge from the ravages of danger and disease. In contrast, "latex is ubiquitous in the medical environment, and health care workers encounter these allergens by multiple routes, including compromised skin and mucous membranes of the respiratory tract. Once sensitized, these healthcare workers are at risk for severe systemic allergic reactions" (Sussman & Beezhold, 1995, p.46). Latex allergy affects millions of persons around the world. Although much progress has been made, there is much to be done. The implementation of policies to provide a latex-safe environment for patients and those who care for them should be a standard within health care today.

Appendix A

## Screening Questionnaire: Natural Rubber Latex Sensitivity

Participant # \_\_\_\_\_ Date \_\_\_\_\_ Age \_\_\_\_\_ Gender \_\_\_\_\_

Job Category \_\_\_\_\_ RN \_\_\_\_\_ LPN \_\_\_\_\_ NA \_\_\_\_\_ Lab Tech \_\_\_\_\_ Non-clinical \_\_\_\_\_ Other \_\_\_\_\_

1. Have you ever been told by a doctor that you have an allergy to any latex product?  
Yes  No

If yes, to what specifically did the doctor say you were allergic? \_\_\_\_\_

---

2. Have you had a reaction to any of the following sources of latex?

	Yes	No		Yes	No
Balloons	<input type="checkbox"/>	<input type="checkbox"/>	Carpet backing	<input type="checkbox"/>	<input type="checkbox"/>
Rubber gloves	<input type="checkbox"/>	<input type="checkbox"/>	Clothing (elastic)	<input type="checkbox"/>	<input type="checkbox"/>
Hot water bottles	<input type="checkbox"/>	<input type="checkbox"/>	Rubber cement	<input type="checkbox"/>	<input type="checkbox"/>
Rubber balls	<input type="checkbox"/>	<input type="checkbox"/>	Suspenders	<input type="checkbox"/>	<input type="checkbox"/>
Rubber bands	<input type="checkbox"/>	<input type="checkbox"/>	Condoms	<input type="checkbox"/>	<input type="checkbox"/>
Adhesive tape	<input type="checkbox"/>	<input type="checkbox"/>	Dental dams	<input type="checkbox"/>	<input type="checkbox"/>
Ace bandages	<input type="checkbox"/>	<input type="checkbox"/>	Band-aids	<input type="checkbox"/>	<input type="checkbox"/>
Belts	<input type="checkbox"/>	<input type="checkbox"/>	Erasers	<input type="checkbox"/>	<input type="checkbox"/>
Foam pillows	<input type="checkbox"/>	<input type="checkbox"/>	Garden hoses	<input type="checkbox"/>	<input type="checkbox"/>
Golf grips	<input type="checkbox"/>	<input type="checkbox"/>	Colostomy bags	<input type="checkbox"/>	<input type="checkbox"/>
Pacifiers	<input type="checkbox"/>	<input type="checkbox"/>	Tennis shoes	<input type="checkbox"/>	<input type="checkbox"/>

3. Do you have a history of...

	Yes	No
Contact dermatitis	<input type="checkbox"/>	<input type="checkbox"/>
Rhinitis or conjunctivitis	<input type="checkbox"/>	<input type="checkbox"/>
Hay fever	<input type="checkbox"/>	<input type="checkbox"/>
Eczema	<input type="checkbox"/>	<input type="checkbox"/>
Autoimmune disease	<input type="checkbox"/>	<input type="checkbox"/>
Asthma	<input type="checkbox"/>	<input type="checkbox"/>

4. Do you have any food allergies?  
Yes  No

If yes, are you allergic to any of the following?

	Onset: Recent	Long-standing
Banana	<input type="checkbox"/>	<input type="checkbox"/>
Avocado	<input type="checkbox"/>	<input type="checkbox"/>
Potato	<input type="checkbox"/>	<input type="checkbox"/>
Kiwi	<input type="checkbox"/>	<input type="checkbox"/>
Chestnuts	<input type="checkbox"/>	<input type="checkbox"/>
Milk	<input type="checkbox"/>	<input type="checkbox"/>

	Onset: Recent	Long-standing
Peaches	<input type="checkbox"/>	<input type="checkbox"/>
Tomato	<input type="checkbox"/>	<input type="checkbox"/>
Papaya	<input type="checkbox"/>	<input type="checkbox"/>
Passion fruit	<input type="checkbox"/>	<input type="checkbox"/>

	Onset: Recent	Long standing
Other _____	<input type="checkbox"/>	<input type="checkbox"/>

5. After handling latex products, have you experienced:

	Yes	No		Yes	No
Chapped hands	<input type="checkbox"/>	<input type="checkbox"/>	Redness	<input type="checkbox"/>	<input type="checkbox"/>
Runny nose/congestion	<input type="checkbox"/>	<input type="checkbox"/>	Swelling	<input type="checkbox"/>	<input type="checkbox"/>
Itching (hands, eyes, etc)	<input type="checkbox"/>	<input type="checkbox"/>	Hives	<input type="checkbox"/>	<input type="checkbox"/>
Wheezing	<input type="checkbox"/>	<input type="checkbox"/>			

6. Have you ever had surgery?

Yes  No

If yes, how many surgeries have you had? \_\_\_\_\_

If yes, did you experience any unexpected response to your surgical experience, such as an allergic reaction? Explain \_\_\_\_\_

7. Have you had extensive dental work?

Yes  No

8. Do you have any congenital abnormalities (such as spina bifida)?

Yes  No

Type \_\_\_\_\_

9. Does your occupation involve frequent contact with products containing latex?

Yes  No

If yes, what products are they? \_\_\_\_\_

10. Have you ever had a severe reaction (anaphylaxis or shock) to a latex product?

Yes  No

If yes, describe the circumstance.

\_\_\_\_\_  
\_\_\_\_\_

What treatment, if any, were you given? \_\_\_\_\_

What precautions do you now take to avoid another reaction? \_\_\_\_\_

\_\_\_\_\_

11. Comments or questions: (Use back of sheet if necessary)

<b>Clinical</b>		
	<b>Reaction to latex products</b>	<b>No reaction to latex products</b>
<b>Surgery yes</b>	80.9 %	80.9 %
<b>No</b>	19.0 %	19.1 %
<b>Occup exposure yes</b>	95.2 %	88.6 %
<b>No</b>	4.8 %	33.3 %
<b>Food allergy yes</b>	22.0 %	14.0 %
<b>No</b>	78.0 %	85.9 %
<b>Atopy yes</b>	65.6 %	39.2 %
<b>No</b>	23.8 %	60.8 %
	<b>Reaction by specific symptom</b>	<b>No symptom</b>
<b>Surgery yes</b>	85.9 %	78.2 %
<b>No</b>	14.1 %	21.8 %
<b>Occup expos yes</b>	93.8 %	90.3 %
<b>No</b>	6.25 %	9.7 %
<b>Food allergy yes</b>	25.4 %	14.0 %
<b>No</b>	78.0 %	86.0 %
<b>Atopy yes</b>	65.6 %	36.2 %
<b>No</b>	34.4 %	63.8 %

<b>Nonclinical</b>		
	<b>Reaction to latex products</b>	<b>No reaction to latex products</b>
<b>Surgery yes</b>	81.7 %	81.7 %
<b>No</b>	18.2 %	18.3 %
<b>Occup expos yes</b>	21.2 %	39.8 %
<b>No</b>	78.8 %	60.2 %
<b>Food allergy yes</b>	52.6 %	8.4 %
<b>No</b>	69.7 %	91.6 %
<b>Atopy yes</b>	48.1 %	24.5 %
<b>No</b>	51.9 %	77.7 %
	<b>Reaction by specific symptom</b>	<b>No symptom</b>
<b>Surgery yes</b>	80.0 %	78.4 %
<b>No</b>	23.1 %	18.7 %
<b>Occup expos yes</b>	34.5 %	34.9 %
<b>No</b>	65.5 %	65.1 %
<b>Food allergy yes</b>	30.0 %	5.1 %
<b>No</b>	70.0 %	48.7 %
<b>Atopy yes</b>	48.1 %	24.5 %
<b>No</b>	51.9 %	75.5 %

Donna L. Baker, RN  
Salisbury State University  
School of Nursing  
Thesis Proposal  
Latex Sensitivity as an Occupational Risk

#### Disclaimer and Consent for Participation

Latex Sensitivity has been identified as an occupational risk for health care workers around the world. Latex products in hospitals and healthcare settings abound due to the superior properties of this natural product. Prevalence studies conducted in many settings have produced results ranging from 2 % to 17 %. To date, the incidence of latex sensitivity among the employees of Beebe Medical Center is unknown.

Therefore, your participation in a study with the intent to identify the number of employees who are latex sensitive or who are at particular risk is appreciated. You are asked to complete a two page questionnaire about your work setting and allergy history. Your identity will be anonymous and confidential. The coding of the forms assures that no one can associate your identity with your completed questionnaire. Only the completed results of the study, without specific data about any individual, will be reviewed by managers or administration of the hospital. Your participation in this survey will not jeopardize your employment at Beebe Medical Center in any way and is not required to maintain your employment. The only risk associated with this survey may be any emotional stress you may experience as you review a few brief questions about your physical health. You may refuse to participate in the study without risk to you or your job.

It is the objective of this survey that with knowledge of the number of persons who have developed a latex sensitivity or are at increased risk of developing a latex sensitivity, important decisions concerning your occupational safety can be made.

Thank you for your cooperation in this survey. Your completion of the questionnaire signifies your consent for participation.



Beebe Medical Center

February 17, 1999

Donna Baker, RN  
OR

Dear Donna:

The study, **Latex Sensitivity In Healthcare Workers**, was reviewed by the Bioethics/Institutional Review Board on **January 14, 1999**. Attached are the rates of procedure by the Institutional Review Board. Your proposed study met / did not meet the following criteria:

		MET	NOT MET
1	Description of the drug, biological or devise with relevant data about what it is, what it does, how it acts, prior research, FDA status and current studies in progress.	✓	
2	Protocol for the proposed study including method of selection of patients and controls.	✓	
3	Known risks, such as prior record of adverse side effects, complications and known contraindications. Plan for care of adverse events.	✓	
4	Consent Form. The consent form should be clear enough so that the patient or his surrogate understands it and which explains the nature of the study.	✓	

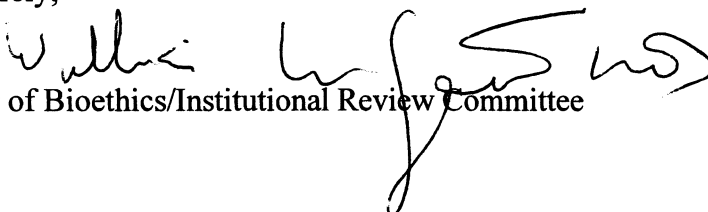
Based on the review the committee:

✓	Approved the study as submitted.
	Approved the study with the following changes submitted in writing to Chair.
	Not approved. Explanation
	Explanation:

Plan to report on the study progress at the **May 13, 1999** meeting. It is the responsibility of the Chief Investigator to maintain adequate clinical records, to report any untoward events and unexpected complications to the committee promptly. No changes in the study protocol can be made without the IRB approval.

Thank you for submitting your proposal.

Sincerely,

  
Chair of Bioethics/Institutional Review Committee





## Statement of Approval Committee on Human Research

Date: October 20, 1998

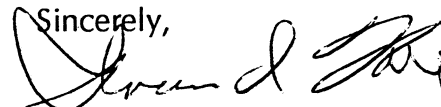
To: Elizabeth Rankin

Title: Latex Allergy As An Occupational Risk

The Committee on Human Research has considered the above application and, on the basis of available evidence, records its opinions as follows:

- (1) The rights and welfare of individual volunteers are adequately protected.
- (2) The methods to secure informed consent are fully appropriate and adequately safeguard the rights of the subjects (in the case of minors, consent is obtained from parents or guardians.)
- (3) The investigators are responsible individuals, competent to handle any risks which may be involved, and the potential medical benefits of the investigation fully justify these studies.
- (4) The investigators assume the responsibility of notifying the Committee on Human Research if any changes should develop in the methodology or the protocol on the research project involving a **risk to the individual volunteers.**

The application is considered to be:  Exempt,  Expedited,  Full Committee.

Sincerely,  


Francis I. Kane, Ph.D.  
Chairman

## References

- Allmers, H., Brehler, R., Chen, Z., Raulf-Heimsoth, M., Fels, H., & Baur, X. (1998). Reduction of latex aeroallergens and latex-specific IgE antibodies in sensitized workers after removal of powdered natural rubber latex gloves in a hospital. Journal of Allergy and Clinical Immunology, 102, (5), 841-846.
- Brehler, R., Theissen, U., Mohr, C., & Luger, T. (1997). "Latex-fruit syndrome": Frequency of cross-reacting IgE antibodies. Allergy 52, 404-410.
- Brown, R. H., Schauble, J. F. & Hamilton, R. G. (1998). Prevalence of latex allergy Among anesthesiologists. Anesthesiology, 89, (2), 292-299.
- Brugnami, G., Marabini, A., Siracuss, A. & Abbritti, G. (1994). Work-related late asthmatic response induced by latex allergy. Journal of Allergy and Clinical Immunology 96,(4), 457-464.
- Burton, A. D. (1997) Latex allergy in health care workers. Occupational Medicine: State of the Art Reviews, 12, 4, 609-626.
- Chen, Z., Crèmer, R., Baur, X. (1997). Latex allergy correlates with operation. Allergy, 52, 873.
- Douglas, R., Morton, J., Czarny, D., & O'Hehir, R. E.(1997). Prevalence of IgE-mediated allergy to latex in hospital nursing staff. Australia New Zealand Journal of Medicine, 27, 165-169.
- Food and Drug Administration. (1998). Guidance on the content and format of premarket Notification [510(k)] submissions for testing for skin sensitization to chemicals in Latex products. Rockville, MD:Lin.

- Freeman, G. L. (1997). Cooccurrence of latex and fruit allergies. Allergy and Asthma Procedures 18,(2), 85-8.
- Fuchs, T., Spitzauer, S., Vente, C, Hevler, J., Kapiotis, S., Rumpold, H., Kraft, D., & Valenta, R. (1997). Natural latex, grass pollen, and weed pollen share IgE epitopes. Journal of Allergy and Clinical Immunology, 100, (3), 356-364.
- Gold, M., Swartz, J. S., Braude, B., M., Dolovich, J., Shandling, B., & Gilmour, R. F. (March, 1991). Intraoperative anaphylaxis: An association with latex sensitivity. Journal of Allergy and Clinical Immunology, 662-666.
- Gonzalez, E. Latex hypersensitivity: A new and unexpected problem. (1992). Hospital Practice 27, (2), 137-151.
- Granger, B. B. & Chulay, M. (1999). Research strategies for clinicians. Stamford, CT: Appleton & Lange.
- Gritter, M. (1998). The latex threat. American Journal of Nursing, 98,(9), 26-33.
- Heese, A., van Hintzenstern, J., Peters, K. P., Koch, H. U., & Hornstein, O. P. (1991) Allergic and irritant reactions to rubber gloves in medical health services. Spectrum, diagnostic approach, and therapy. Journal of the American Academy of Dermatology, 25, 831-9.
- Holzman, R. S. (1993). Latex allergy: An emerging operating room problem. Anesthesia Analogs, 76, 635-41.
- Johns, C. (1998). A call to action: Latex allergy in the workplace. Surgical Services Management, 4, (3), 41-44.
- Kibby, T. & Akl, M. (1997). Prevalence of latex sensitization in a hospital employee Population. Annals of Allergy, Asthma and Immunology, 78, 41-44.

- Kobrynski, L. J. (1996, October). Latex: Allergen of the '90's. Contemporary OB/GYN, 93-106.
- Leung, R., Ho, A., Choy, D., & Lai, C. K. W. (1997). Prevalence of latex allergy in hospital staff in Hong Kong. Clinical and Experimental Allergy, 27, 167-174.
- Liss, G. M., Sussman, G. L., Deal, K., Brown, S., Cividino, M., Siu, S., Beezhold, D. H., Smith, G., Swanson, M. C., Yunginger, J., Douglas, A., Holness, D.L., Lebert, P., Keith, P., Wasserman, S., & Turjanmaa, K. (1996). Latex allergy: Epidemiological study of 1351 hospital workers. Occupational and Environmental Medicine, 54, 335-342.
- Mace, S. R., Sussman, G. L., Liss, G., Starl, D., Beezhold, D., Thompson, R., & Kelly, K. (1997). Latex allergy in operating room nurses. Annals of Allergy, Asthma & Immunology, 80, 252-256.
- Mikkola, J. H., Alenius, H., Kalkkinen, N., Turjanmaa, K., Palosuo, T., & Reunala, T. (1998). Hevein-like protein domains as a possible cause for allergen cross-reactivity between latex and banana. Journal of Allergy and Clinical Immunology, 102, 6, 1005-1012.
- M'Raihi, L., Charpin, D., Pons, A., Bongrand, P. & Vervloet, D. Cross-reactivity between latex and banana. Journal of Allergy and Clinical Immunology, 87, 129-130.
- National Institute for Occupational Safety and Health. (1997). NIOSH Alert: Preventing allergic reactions to latex in the workplace, (DHHS Publication No. 97-135). Washington, DC: US Government Printing Office.

- Neuman, B. (Ed.) (1982). The Neuman systems model: Application to nursing education and practice. New York: Appleton-Century-Crofts.
- Neuman, B. (Ed.) (1989). The Neuman's systems model. (2<sup>nd</sup> Ed.). Norwalk, CN: Appleton & Lange.
- No one formula for gloves purchasing decision. (1997, February). OR Manager, 13, p. 6.
- Polit, D. F. & Hungler, B. P. (1995). Nursing research (5<sup>th</sup> ed.) Philadelphia: Lippincott.
- Porri, F., Lemiere, C., Birnbaum, J., Guilloux, L., Lanteaume, A., Didelot, R., Vervloet, D., & Charpin, D. (1997a). Prevalence of latex sensitization in subjects attending health screening: Implications for a perioperative screening. Clinical and Experimental Allergy 27, 413-7.
- Porri, F., Pradal, M., Lemiere, C., Bimbaum, J., Mege, J. L., Lanteaume, A., Charpin, D. Vervicet, D., & Camboulives, J. (1997b). Association between latex sensitization and repeated latex exposure in children. Anesthesiology 86, 599-602.
- Price, S. A. & Wilson, L. M. (1992). Pathophysiology: Clinical concepts of disease processes. St. Louis: Mosby.
- Safadi, G. S., Corey, C., Taylor, J. S., Wagner, W. O., Pien, L. C. & Melton, A. L. (1996). Latex hypersensitivity in emergency medical service providers. Annals of Allergy, Asthma and Immunology, 77, 39-42.
- Shah, S., Cawley, M., Gleeson, R., O'Connor, J., & McGeady, S. (1998). Latex allergy and latex sensitization in children and adolescents with meningomyelocele. Journal of Allergy and Clinical Immunology, 101, (6), 714-746.

- Solomon, W. R. (1992). Familiar allergic disorders: Anaphylaxis and the atopic diseases. In S. A. Price & L. M. Wilson (Eds.), Pathophysiology: Clinical concepts and disease processes (p.111). St. Louis: Mosby.
- Sussman, G. L. & Beezhold, D. H. (1995). Allergy to latex rubber. Annals of Internal Medicine 122, (1), 43-46.
- Sussman, G. L. & Beezhold, D. H. (1997). Latex allergy: A clinical perspective. Surgical Services Management, 3, (2), 25-28.
- Sussman, G. L. & Gold, M. (1996). Guidelines for the management of latex allergies and safe latex use in health care facilities. Arlington Heights, IL: American College of Allergy, Asthma & Immunology.
- Sussman, G., Tarlo, S., & Dolovich, J. (1991). The spectrum of IgE-mediated responses to latex. Journal of American Medical Association 265,(21), 2844-7.
- Swanson, M. C., Bubak, M. E., Hunt, L. W., Yunginger, J. W., Warner, M. A., & Reed, C. (1993). Quantification of occupational latex aeroallergens in a medical center. Journal Of Allergy and Clinical Immunology 94,(3), 445-451.
- Tan, B. B., Lear, J.T.,atts, J., Jones, P. & English, J. S. (1997). C. Perioperative collapse: Prevalence of latex allergy in patients sensitive to anaesthetic agents. Contact Dermatitis 36, 47-50.
- Tarlo, S. M., Sussman, G. L. & Holness, L. (1997). Latex sensitivity in dental students and staff: A cross-sectional study. Journal of Allergy and Clinical Immunology, 99,(3), 396-400.
- Valanis, B. (1992). Epidemiology in nursing and health care. Norwalk, CN: Appleton & Lange.

- Warshaw, E. M. (1998). Latex allergy. Journal of the American Academy of Dermatology, 39(1), 1-24.
- Watts, D. N., Jacobs, R. R., Forrester, B., & Bartolucci, A. (1998). An evaluation of the Prevalence of latex sensitivity among atopic and non-atopic intensive care workers. American Journal of Industrial Medicine, 34, 359-363.
- Weinert, G. (1998) Latex allergy costs. Surgical Services Management, 4, (3), 27-30.
- Young, M. (1998). Strategies for a latex-safe environment. Surgical Services Management, 4, (3), 19-24.





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Work:  
Beebe Medical Center  
242 Savannah Road  
Lewes, DE 19958  
(302) 645-3119

### **Education**

Reading Hospital School of Nursing Reading, PA	Diploma in Nursing	1972
Wilmington College <i>Magna Cum Laude</i> New Castle, DE	BSN	1993
Salisbury State University Salisbury, MD	MSN	Expected completion May 1999

### **Licensure**

State of Delaware	L1 0014662	1982-present
State of Maryland		1975-1982

### **Professional Experience**

Beebe Medical Center Lewes, DE	ORSOS Information Systems Coordinator Surgical Services	1996-present
	Staff Nurse - Operating Room - Clinical Nurse II	1987-1996
	Staff Nurse - Med Surg	1982-1987
Union Hospital of Cecil County Elkton, MD	Staff Nurse - Obstetrics	1980-1982
Dr. Wallace Obenshain Cecilton, MD	Office Nurse - General Practice	1977-1980
Kent & Queen Ann's Hospital Chestertown, MD	Staff Nurse - Obstetrics	1975-1977
Sibley Memorial Hospital Washington, DC	Staff Nurse - Obstetrics Staff Nurse - Pediatrics	1973-1975 1972-1973
Parent & Child, Inc. Washington, DC	Natural Childbirth Instructor	1973-1975

### ***Publications***

- 1997 Self Learning Packet - Latex Allergy  
*Beebe Medical Center*
- 1998 Training Manual - ORSOS Perioperative Documentation  
*Beebe Medical Center*
- 1996 ORSOS Policy and Procedure Manual  
*Beebe Medical Center*

### ***Professional Organization Membership***

- 1988-present Association of Operating Room Nurses, Inc.  
1988-present AORN of Del-A-Mar Chapter  
1993-1997 Nursing Honor Society of Wilmington College  
1997-present Sigma Theta Tau, Lambda Eta Chapter

### ***Professional Presentations***

- 1996 Beebe Medical Center Medical Staff  
*The ORSOS Information System*
- 1996 Beebe School of Nursing Alumni Association Annual Continuing Education Program  
*Laparoscopic Procedures in General Surgery: The Nursing Focus*
- 1997 Beebe School of Nursing Faculty  
*Latex Allergy*
- 1997 Beebe Medical Center Managers and Supervisors  
*Latex Allergy*
- 1997 Beebe Medical Center Steering Committee  
*ORSOS Update*
- 1997 Beebe Medical Center Operating Room Staff  
*Latex Allergy*
- 1997 Beebe Medical Center Operating Room Staff  
*Lymphoedema in the Postsurgical Mastectomy Patient*

- 1997 Johns Hopkins Operating Room Nurse Managers  
*Lymphoedema in the Postsurgical Mastectomy Patient*
- 1998 Beebe School of Nursing Student Body  
*Latex Allergy*
- 1998 Beebe School of Nursing Alumni Association  
*Latex Allergy*
- 1999 Maryland/Delaware American Society of Perianesthesia Nurses  
*Latex Allergy*

### ***Accomplishments***

#### *Educator*

- Developed an orientation program for all new employees (OR staff nurses, Sterile Processing technicians, Materials Management technicians) in the department of surgical services to the ORSOS information system.

#### *Consultant*

- Offer ongoing support, information and consultation to all ORSOS users.
- Function as the unofficial latex allergy expert at my current institution, receiving frequent questions from employees and patients concerning latex allergy.

#### *Nurse Leader*

- Served on hospital Latex Allergy Task Force (1997-1998). Developed the hospital latex allergy policy and procedure as we instituted a hospital wide plan for a latex-safe environment for our latex sensitive patients.
- Researched, located and facilitated the purchase of a stand alone OR scheduling system. Implemented the installation and trained scheduling clerk and charge nurses on the system. Designed and generated all management reports from the system.
- Served on the hospital OR Information System Task Force to purchase a network OR scheduling system.
- Originated the role as Surgical Services Information System Coordinator.
- Designed and coordinated the implementation of the ORSOS scheduling system.
- In consultation with anesthesia and OR staff, built all foundational databases for the system.

### ***References***

Will be provided on request