

lished with free drapes. A longitudinal incision was made following the lateral aspect of the left thigh and extending distally to the knee. The incision was taken down through to the subcutaneous tissue. Necrotizing fasciitis was noted, as characterized by necrosis, oedema and odour of the tissues. Multiple biopsies and cultures were obtained of both fascia and underlying muscle tissue. Debridement of infected tissues was carried out. The muscle tissue was noted to be pink and healthy after irrigation of superficial fascia using nine litres of NaCl with 50,000 units of bacitracin per litre. This solution was applied using a pulse lavage system. The sub fascial layer was not involved in the infection. The wound was left open, packed with Saline and Bacitracin soaked dressing. The patient tolerated the procedure well with no intra operative complications. Estimated blood loss was approximately 100 mls. The patient was transferred post operatively to the ICU.

Laboratory analysis confirmed the diagnosis of group A Streptococcal Fasciitis. The patient subsequently returned to the Operating Room for debridement and irrigation with packing change. The wound was left open and secondary wound closure followed. The patient continued with intravenous and oral antibiotics. Physiotherapy visited him and provided him with isometric exercises for strengthening of his left quadriceps muscle. The patient was allowed to weight bear as tolerated with crutches. The patient was discharged from hospital on March 10 with an appointment to follow up with the Microbiologist and Orthopaedic surgeon at Mount Sinai Hospital, Toronto.

Four Cases Treated

Mount Sinai Hospital has treated four such cases since without loss of limb using our established combined protocol of hemodynamic patient monitoring, intravenous antibiotics, and surgery involving debridement and irrigation.

"Minor trauma can precipitate a severe soft tissue infection. Pain can be the earliest and only finding. Prompt recognition of the process, antibiotic therapy and most importantly, early surgical debridement are the cornerstones of therapy," (Defers & Low, 1991).

Acknowledgment

Acknowledgment is given to my colleagues at Mount Sinai Hospital in the Operating Room and

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Latex Allergy in the Nursing Population

By B. Cowperthwaite, K. LaPlante, B. Mahon & T. Markowski

Latex allergies have received more attention in medical texts over the last ten years. On reviewing the literature, there is documentation surrounding the effects of latex gloves with respect to allergies. There is less about specific information related to nursing and the health of nurses with respect to allergies. Yet, Pisarcik Lenehan (1997) states "An estimated 2,200,000 nurses (or one in 10 of all nurses) . . . have a latex allergy." More recently, reactions such as "airway compromise and anaphylaxis" (Pisarcik Lenehan, 1997) have been increasing. With these reactions noted, a latex allergy can be career-ending for a nurse practicing in an acute care facility. For that reason, we have chosen to analyze major health issues related to latex allergy in the nursing population. The Neuman model will provide the framework for devel-

oping effective strategies to deal with this issue.

Latex is present in patient related equipment such as intravenous tubing, adhesive tape, ambu bags, band-aids, tourniquets, endotracheal tubes, enema tubing as well as countless others. It is evident that, in providing only the basics of patient care, nurses are constantly exposed to latex products. This exposure puts nurses at risk for developing latex sensitization and/or latex allergies. Direct contact of the latex protein by wearing gloves and inhalation of latex particles aerosolized from powdered latex gloves cause the most exposure. Turjanmaa reported in 1987 that 5.6% of the nurses in surgical units were allergic to latex, compared to 2.9% in the general health care population. (Steiner & Schwager, 1995). Charpin reported a 10.6% latex allergy in operating room nurses and Iacobelli in 1992 reports a 14.4% latex allergy in operating room personnel (Steiner & Schwager, 1995). Although allergic reactions to latex were documented more than 50 years ago, it is only recently that emphasis was placed on this increasing health care problem.

Many reports of latex allergy concern atopic individuals; that is, individuals with a clinical hypersensitivity state that is subject to hereditary influences. There is a positive association between atopic status

Abstract

This paper analyzes the major health issue "latex allergy," and risk reduction for nurses (aggregate). First, the historical significance of latex in the environment is discussed along with our rationale for choosing latex allergy as a major health issue. Identification, description and justification of the use of Neuman's systems model are evident throughout the paper. In this model, assessment is incorporated into the nursing diagnosis of the nursing process. The second category of the nursing process, planning of actual goals, is negotiated with the client/client system. Intervention strategies are implemented in the last stage of the nursing process, nursing outcomes. The last two categories are formulated into a chart for better clarification of the goals with rationale. Lastly, an evaluation of the goals is discussed.

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and the risk of a latex allergy. Among the group of OR nurses studied in Marseille, those with a history of allergic rhinitis and/or asthma had a 4.4-fold higher risk of being allergic to latex. (Levy, Charpin, Pecquet, Leynadier, & Vervloet, 1992). Health care workers with atopic allergies have been reported to have a 24% prevalence of positive results of skin-prick-testing and 50% of this group were clinically asymptomatic (Sussman & Beezhold, 1995).

Steiner and Schwager (1995) note that:

Since 1987, when the Center for Disease Control and Prevention issued recommendations that all hospitals adopt "universal precautions" to prevent the spread of the human immunodeficiency virus (HIV) to health care workers, including the use of gloves for care of all patients when blood or body fluid contact might occur, . . . the problems of latex allergy have increased dramatically.

Not only did the use of latex gloves increase from 800 million to 10 billion within a two year period (Kellett, 1997), but the process to make the gloves changed to keep pace with demand. Kellett also states:

The result was a huge influx of cheap, poorly produced . . . latex gloves. When the amount of protein and latex allergens are extracted from latex glove material and measured, the results are startling. The allergenic effect can vary up to 3000-fold between the best and worst latex gloves. (p. 28)

Rubber gloves were first implicated as a cause of contact dermatitis in 1933 (Steiner & Schwager, 1995). The first immediate hypersensitivity reaction to latex was described by Nutter in 1979. The prevalence of latex allergies in the general population is approximately 1% (Sussman & Beezhold, 1995). Almost 50% of the reported cases have occurred in health care workers and in patients undergoing surgical procedures or internal examinations (Levy et al., 1992). While gloves have latex content, they also contain a secondary concerning problem. Most gloves have powder inserted to allow easier donning. Kellett (1997) states:

The corn starch powder, used as a lubricant and donning aid, is a major contributor to the problem of latex allergy. The latex protein allergens on the glove absorb onto the powder granules, thus concentrating the allergen. This makes it easier for the allergens to enter the skin or mucous membranes. When gloves are put on and removed, this powder-antigen complex is released into the atmosphere,

entering lungs and open wounds.

Another explanation for the increased prevalence of latex allergies is the likelihood that physicians are better able to identify and diagnose the allergy. Recognition has probably lead to higher reported cases.

In order to understand latex allergy, the nature of the manufacturing of latex needs to be understood. Natural latex rubber is a processed plant product from the latex or the milky cytosol of the rubber tree *Hevea Brasiliensis*. Latex is composed of various lipids, phospholipids and proteins. The proteins are responsible for allergic sensitization predisposing to IgE mediated reactions. Chemical additives are added to the product to preserve, to cure, and to give latex its desirable properties of flexibility and protection. Although the chemical additives are not the cause of the immediate generalized allergic reaction, they contribute to some of the local skin reactions. Latex allergy prevalence rates of 10% have been reported among heavy glove users such as surgeons and operating room nurses (McCormack, Camerson, & Biel, 1995).

The first of four types of reaction associated with latex, is Contact Dermatitis. It "is the most common clinical reaction associated with latex" (Sussman & Gold, 1996). The client may present with dryness, cracking, scaling, erythema and vesicle formation on their hands.

Irritant Contact Dermatitis, the second type of reaction, "is a non-allergic skin rash . . . due to mechanical irritation from sweating or rubbing of the hands under the glove and from residual soaps . . . in prolonged contact with the gloved cutaneous surface" (Sussman & Gold, 1996).

Allergic Contact Dermatitis (ACD), also referred to as chemical sensitivity dermatitis, is often characterized by eczematous skin on the top of the hands to the wrist where the glove ends. In ACD, the etiologic agents involved are chemical additives such as accelerators or antioxidants, which are used in the production of latex rather than latex proteins (Sussman & Gold, 1996).

Sussman & Gold confirm that contact dermatitis, irritant or allergic contact reactions may increase the risk of latex sensitization due to a skin barrier breakdown. This may precede the onset of an IgE mediated hypersensitivity reaction.

The final reaction caused by latex is the Immediate Allergic Reaction. Sussman & Gold state:

"An immediate allergic reaction (or IgE mediated hypersensitivity reaction) is caused by latex proteins which directly sensitize the patient and subsequently cause allergic symptoms."



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The Immediate Allergic Reaction may be localized or systemic. Reactions are triggered by direct contact or inhalation of the protein on the skin, mucosal or serosal surfaces. The reactions vary in severity from mild to life threatening. Between 1988 and 1992 the Food and Drug Administration in the US received reports of more than 1000 systemic allergic reactions to latex, 15 of which were fatal. Severity cannot be predicted; people who have had mild reactions may react severely at next exposure (Sussman & Beezhold, 1995). At this point, the disease process needs incorporation into the Nursing framework.

Neuman's Systems Model

In Neuman's framework, "The central core is a basic structure of survival factors common to the species, such as variables contained within it, innate or genetic factors, and strength and weakness of the system parts" (Fawcett, 1995). The outermost ring, the flexible line of defence, forms a protective buffer for the client's stable state. This accordion-like mechanism provides greater protection against a latex invasion when it is expanded away from the normal line of defence and less protection when it contracts closer to the normal line of defence. This second protective mechanism, normal line of defence, represents the adjustment of the client system to environmental stressors (latex). Like the flexible line, the normal line of defence is penetrated by the latex stressor when the flexible line of defence cannot withstand the impact. Now, an illness in the form of a latex reaction occurs as a result of the normal line of defence being rendered ineffective against the invasion of the stressor. The third protective layer, the lines of resistance, is involuntarily activated when latex invades the normal line of defence. These lines attempt to stabilize the client system by using internal factors that support the basic structure, i.e., activation of the immune system and mobilization of white blood cells. If the lines of resistance are ineffective against the invasion of latex allergens, energy depletion occurs and death may ensue. The system can reconstitute if the lines of resistance are effective (Fawcett, 1995).

The two major components in Neuman's model are stress and the reaction to stress. When we look at latex allergies, the stress will differ depending upon what caused the allergy. Was it due to the latex proteins, irritation of the gloves, chemicals in the

gloves, amount of time latex gloves were worn, or did sensitivity occur due to a breakdown in skin barriers? (Fawcett, 1995)

Neuman refers to the environment and how both the client and the environment may be affected either positively or negatively by each other. The environment plays a major role in the development of a latex allergy. Some individuals may have a genetic predisposition to develop an allergy due to risk factors such as atopic conditions or persisting food allergies (Fawcett, 1995).

The idea of maintaining optimal system stability fits well with the stated goals to prevent latex allergies. This is done by primary prevention to reduce exposure. If a nurse has already been sensitized, our goal is to prevent further reactions. This is done by reducing exposure to the latex protein through prevention. Throughout our interventions the nurse attempts to reduce or eliminate the stressor causing the reactions. By doing this we are attempting to achieve optimal system stability (Fawcett, 1995).

Neuman's nursing process format consists of three categories: nursing diagnosis, nursing goals, and nursing outcomes. Nursing diagnosis encompasses data collection about the dynamic interactions among the physiological, psychological, sociocultural, developmental, and spiritual variables which make up the client system. These five variables are part of the basic structure, the flexible line of defence, the normal line of defence, and the lines of resistance. Neuman incorporates assessment into the nursing diagnosis of the nursing process. She believes that proper assessment requires taking into account both the client's/client system's perception and the caregiver's perceptions of the five variables (Fawcett, 1995). According to Kellett (1997), a complete medical history is essential to diagnosis of a latex allergy. It is essential to determine if the client/client system is in a high risk group. This group consists of health care workers, latex industry workers and clients who have had multiple procedures.

First, a data base will be established incorporating the dynamic interactions of the five variables, and how they are affected by the three types of stressors (intrapersonal, interpersonal, extrapersonal). Intrapersonal risk factors are concerned with the internal environment, and consists of all the interactive influences within the boundaries of the defined client/client system (Fawcett, 1995).

Intrapersonal Risk Factors

Physiological Risk Factors

These risk factors include the client's/client system's auto-immune response to stressors. Some individuals have specific antibodies called IgE antibodies, which make them hypersensitive to the proteins found in natural rubber latex. This IgE mediated reaction to latex proteins is responsible for most of the severe allergic reactions (Sussman & Gold, 1995).

Diagnostic testing, to validate this excessive immune response include patch testing, skin-prick testing, intradermal testing, basophil histamine release testing (BHRT), lymphocyte proliferation treating (LPT), radioallergosorbent testing (RAST), enzyme-linked immunosorbent assay (ELIZA), latex allergosorbent testing (LAST), and inhalation challenge testing (Sussman & Beezhold, 1995).

The patch test is a method for allergen identification in allergic contact dermatitis. The immunogenic rubber additive chemicals of appropriate concentration are taped on a client's back for 48-96 hours, and the skin is observed for a reaction (Sussman & Beezhold, 1995).

In the skin-prick test, an antigen in solution is dropped onto the skin, and the skin is pricked gently with a needle through the solution. Skin-prick tests are almost 100% sensitive and specific, and are therefore very reliable. The incidence of untoward reaction is small (Holtzman, 1993).

Intradermal testing is also 100% sensitive because the diluted antigen solution is injected intradermally. The reaction is graded from 1+ to 4+. This type of testing carries a greater risk of systemic reaction because the antigen cannot be wiped from the skin (Holtzman, 1993).

According to Holtzman only 93% of clients with latex contact urticaria were reactive in the basophil histamine release test, and only 20% in the lymphocyte proliferation test. Also, radioallergosorbent concordance with the skin-prick test varies from 59% to 93% depending on the allergy. Steiner and Schwager (1995), believe the radioallergosorbent test to be highly specific with a 50-60% sensitivity. Also, the enzyme-linked immunosorbent assay has a 66% specificity with an 87% sensitivity. Holtzman (1993) found that the latex allergosorbent test correlates with an "r" value of .92 to the latex radioallergosorbent test. A negative latex-specific IgE test does not rule out a latex allergy.

Inhalation challenge tests, or bronchial provocation tests can assess the response of a client to the aerosolized latex allergen. Anaphylactic-type reactions have been noted using this method. The goal of bronchial challenge testing is to detect and quantify airway hypersensitivity (Steiner & Schwager, 1995).

Clients are in a high risk group if they have had symptoms such as hives, swelling, eye/nasal itching, sneezing, coughing, wheezing which is an IgE mediated hypersensitivity reaction. The body produces these IgE antibodies as a part of its defence mechanism against the invasion of the latex stressor (antigen). This reaction causes the release of mast cells and basophils, which release histamine leukotrienes, prostaglandins and kinins (Kellett, 1997).

Allergic contact dermatitis is a specific immune-response of sensitized lymphocytes to chemical additives contained in latex products. This delayed hypersensitive response usually occurs 48-96 hours after exposure. Skin becomes dry, crusted, and thickened with hard bumps and sores (Sussman & Gold, 1996).

According to Neuman (1995) this latex stressor disrupts the forces which operate within or on the system. Latex causes a disequilibrium in the system as a result of the invasion of this tension producing stimuli (Fawcett, 1995).

Sussman & Beezhold (1995) state "Other risk factors are female sex.". Grzybowski, et al. (1996) further state "Biologic mechanisms responsible for association between latex allergy and possible risk factors require further investigation. The different proportions of detectable anti-latex IgE between sexes may be due to hormonal influences . . .".

Nutritional assessment is very important in latex allergy. Sussman & Gold (1995) believe that people with certain food allergies, including banana, avocado, chestnut, apricot, kiwi, papaya, passion fruit, pineapple, peach, nectarine, plum, cherry, melon, fig, grape, potato, tomato, and celery may have a coexisting latex allergy. Other food and food products include, apple, pear, carrot, hazelnut, wheat, rye, mugwort, profilin, potatin, plant stress proteins, and ficus. The observed cross-reactivity of latex with avocado, kiwi and chestnut probably occurs because latex proteins are structural homologous with other plant proteins (Sussman & Beezhold, 1995). It is interesting to note that individuals with food allergies may be at risk for developing latex allergies. In a study done by Pecquet, 50% of the patients seen had an allergic reaction to a fruit. The most frequently mentioned being banana, avocado, and kiwi. Less frequently noted were apricot, chestnut, grape, passion fruit and pineapple (Levy et al., 1992). Not all clients with these food allergies will be allergic to latex, and not all clients with a latex allergy will react to these foods (Sussman & Beezhold, 1995).

Sociocultural

The risk factors within the sociocultural variable include conditioned responses. Nurses are known to overuse latex gloves to protect themselves from viruses, (Zaza, Reeder, Charles & Jarvis, 1994).

Other variables include any attitudes, values, or norms of clients, that put them at risk for latex allergy. Our cultural environment determines what we believe in, and shapes our lives. Nurses' beliefs of folk diseases and medicines may also put them at risk (Neuman, 1995).

Psychological

Examples of psychological risk factors include: lack of motivation for wellness, lack of sense of self, lack of well-being, lack of belonging, depression, emotional pain, isolation, fear of reactions to latex, powerlessness, and relocation trauma. Also, nurses are at risk if they lack awareness and understanding of latex allergies, the related interventions and treatment (Neuman, 1995).

Developmental

Risk factors under the developmental variable include age, level of education, and any change from the normal developmental pattern that puts clients at risk (Neuman, 1995).

Spiritual

Spiritual distress occurs when nurses have a lack of belief in hope and the pursuit of optimal wellness. This occurs when nurses feel they have no control over latex exposure and subsequently allergens control their life. Nurses in spiritual distress have lost hope for a positive outcome. The spiritual variable controls the mind and the mind controls the body. It includes a sense of power, creative energy, hope or hopelessness or despair, love, caring, etc. Lack of spirituality leads to spiritual distress, loneliness, powerlessness, anxiety, fear, guilt, anger, depression, hopelessness, and a low self-esteem (Neuman, 1995).

Interpersonal Risk Factors

The external environment consists of all the interaction of influences existing outside the client/client system and is interpersonal and extrapersonal in nature. First the interpersonal risk factors will be assessed. These stressors occur at the boundary between the system and the proximal external environment (Neuman, 1995).

Physiological Risk Factors

These physiological variables, include any latex products found in the home, i.e., toys, latex paint,

carpet etc. Risk factors also include any latex products found in the hospital and/or in close proximity to the workplace.

If risk factors are present, support people are required to respond to an emergency situation. If no support people are readily available, the degree of risk is increased.

Sociocultural

Detrimental family environment produces stress. Children in the home need to conform to their peer group behaviours. If they are restricted from having normal clothing or popular toys, they are not accepted as readily into a peer circle of play. Conversely, by having the in-fashion articles, they may put themselves or others at risk. Support of people's values and attitudes may also put the client at risk. In the work environment, a latex allergy is often not taken seriously. Health care workers will mimic media shows where gloves are peeled off with no concern for aerosolized particles. The economic realities in the hospital often hamper the effort to reduce latex products. Role conflict and expectations at work may also put the individual at risk.

Psychological

In poor family relationships their lack of support, communication, awareness, and understanding of latex allergy puts individuals at risk. Poor co-worker relationships and their unwillingness to decrease latex in the workplace increase the risk for all employees. Ineffective crisis response from family, friends, and health care professionals further increases the risk.

Developmental

The developmental risk factors for latex allergy include support people's lack of maturity, lack of knowledge and poor communication.

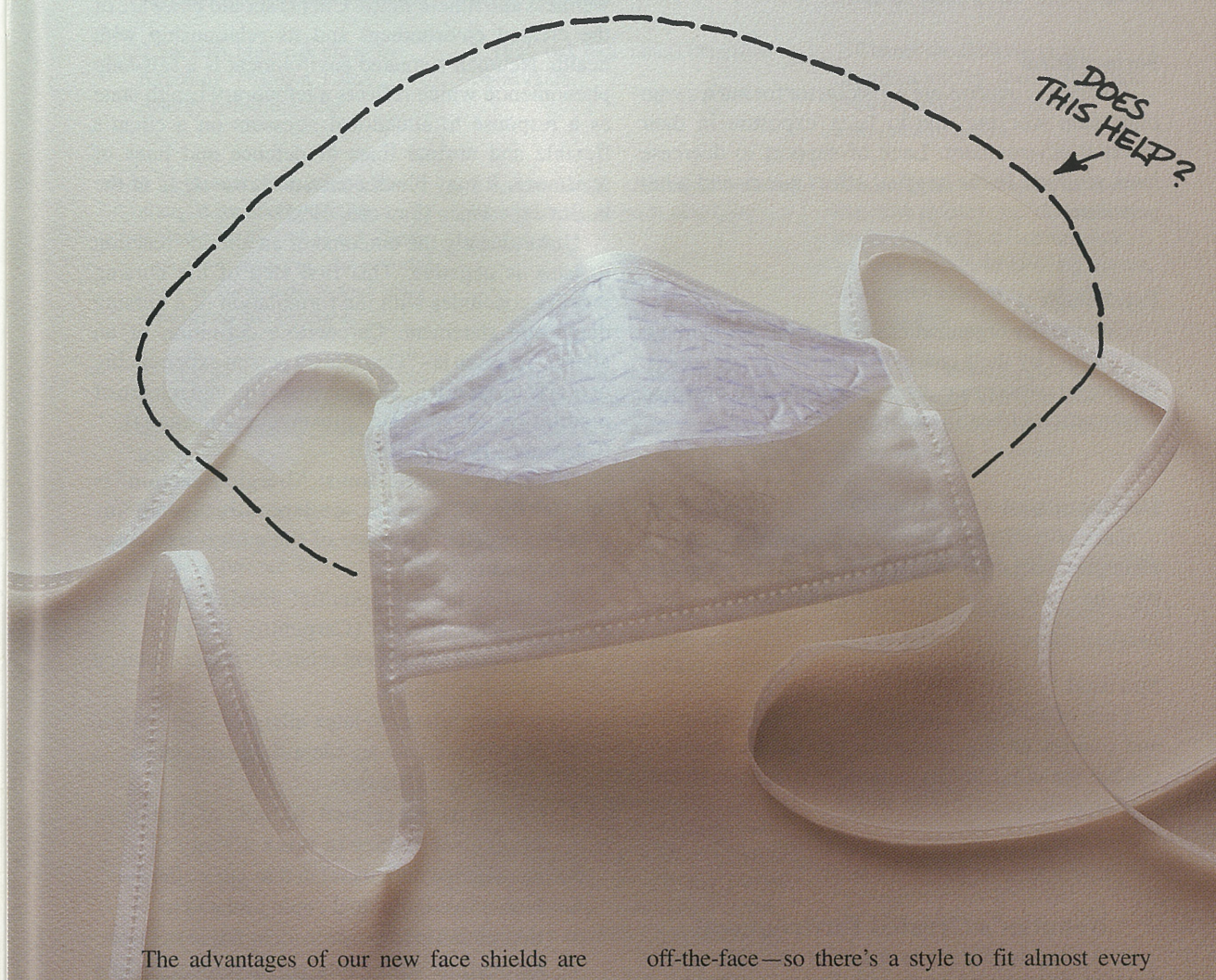
Spiritual

The spiritual risk factors include support people's lack of belief in hope and their pursuit of optimal wellness for themselves and the client.

Extrapersonal Risk Factors

Extrapersonal stressors are also in the external environment. They occur at the boundary of the client/client system and the distal external environment (Neuman, 1995).

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Physiological Risk Factors

The physiological variable includes latex as an environmental hazard both inside and outside the workplace. Lack of a support system is exemplified by the substandard, or inappropriate product labelling by manufacturers, and the failure to decrease the protein and chemical content of latex products. Also, hospitals have been slow to develop policies in response to the increasing hazards of latex.

Sociocultural

Financial concerns are a risk factor for nurses who must stop working due to latex exposure in their external environment. Lack of support to decrease latex products in the hospital affect nurses and other personnel.

Psychological

Community organizations and businesses increase risk factors by their continued use of latex products. Prolonged workplace latex exposure can increase sensitization of health care providers.

Developmental

Lack of available educational programs, marketing strategies, social policies and government programs puts the client at risk for sensitization to latex.

Spiritual

Lack of spiritual support from religious affiliation and control of life circumstances, i.e., a locus of control [external versus internal] influences client's available choices.

Neuman's Created Environment

It is very important to discover the client/client system's created environment. "It is dynamic and represents the client's unconscious mobilization of all system variables (including the basic structure energy factors) toward systems integration, stability and integrity." (Fawcett, 1995). It offers a protective coping shield for system function as the client is usually not aware of the host of existing psychosocial and physiological influences. The created environment's insulation effect changes the possible response of the client to environmental stressors - for example, the

denial of latex allergy. The client's perception is directly related to coping. The created environment is intra, inter and extrapersonal in nature. It is based on unconscious knowledge, self-esteem, belief, energy exchanges, system variables and predisposition. This is apparent when fearful nurses continue to expose themselves to latex in order to maintain their job.

All causal factors must be evaluated as to innate internal or external factors affecting the client in wellness and illness states. Clients should be aware of the created environment and its relationship with health. Neuman's created environment is a self-help phenomenon which reflects a temporary health state as a response to situational stressors on a client's flexible and normal lines of defence and lines of resistance. It may block conscious awareness of the health experience (Fawcett, 1995).

Unfortunately the outcome of an allergic reaction to latex is negative. This first step of the nursing process concludes with the formulation of a nursing diagnostic statement. Carpenito's definition of an allergic reaction is - "Describes a person experiencing or at risk to experience hypersensitivity and release of mediators to specific substances (antigens). " (Carpenito, 1995, p. 1020)

"Potential complications: Allergic Reaction" is one of the 52 specific collaborative problems grouped together because of their high incidence and morbidity.

The following are potential nursing diagnoses related to latex allergy: (Carpenito, 1995)

1. Impaired adjustment related to nonacceptance of latex allergy.
2. Anxiety related to latex allergy.
3. Fear related to an identifiable dangerous source (latex allergy).
4. Hopelessness related to lack of personal choice secondary to latex allergy.
5. Knowledge deficits related to latex allergy.
6. Ineffective individual coping related to depression in response to identifiable stressors.
7. Relocation stress related to relocation of a work site.
8. Risks for altered respiratory function related to an environmental allergen.
9. Spiritual distress related to conflict between religious and spiritual beliefs and prescribed health regimens.
10. Impaired skin integrity related to disruptions of epidermal and dermal tissue secondary to an allergic reaction.

Summary of Nursing Goals with Rationale

Primary Prevention Immediate Goals:

1. Strengthen flexible line of defence to decrease risk of developing sensitization to latex.
2. Identify high-risk client by screening - using a Latex Allergy Questionnaire.
3. High-risk client referred to allergist for allergy testing, including latex. **High risk clients: -use gloves regularly, -have existing allergies, particularly to food, -have hand dermatitis or eczema.*
4. Educate the client about signs & symptoms of a possible latex allergic; encourage to report them.
5. Facilities wide review of glove usage to determine appropriateness of use to prevent the unnecessary use of latex gloves.

Rationale: *Maintain client optimal level of wellness.
*Reduce encounter or risk of an encounter with a destructive stressor -, i.e., natural rubber latex
*Strengthen flexible line of defence by preventing stress and reducing risk factors to develop sensitization to latex. *Prevent stressor invasion. *Motivate toward wellness.(Fawcett, 1995).

Secondary Prevention Immediate Goals:

1. Provide latex safe working environment, i.e., latex reduced or latex restricted.
2. High-risk individuals identified to co-workers.
3. Latex-allergic clients use only non-latex gloves and other non-latex products.
4. Other persons in same work environment change to low protein, low powder or powder free latex gloves.
5. Develop a database of all hospital latex products.
6. Environmental and duct cleaning to eliminate accumulated latex particles from air handling systems.
7. Clients with contact dermatitis requiring frequent glove usage should:
i. wear white cotton gloves under non-latex gloves to prevent heating and sweating of hands. ii. avoid using oil-based hand lubricants following surgical scrub and before donning latex gloves. iii. use unscented soaps free of colour, chemicals, antiseptics, and deodorants.

Rationale: *Strengthen the internal lines of resistance through early case finding and treatment of symptoms. *Protect basic structure. *Maximize and optimize internal/external resources to obtain stability and energy conservation. *Motivate, educate and involve client/client system in health care goals. *Facilitate appropriate treatment and intervention measures. *Support positive factors toward wellness. (Fawcett, 1995).

Tertiary Prevention Immediate Goals:

1. Provide latex safe environment, i.e., use only non-latex gloves and avoid all latex containing products.
2. Clients should have proper identification (eg. medic-alert) and always carry an epinephrine auto-injector device.
3. Awareness of non-employment exposure to latex, eg. undergoing dental and medical examinations, wearing household cleaning gloves, using latex condoms, blowing-up balloons etc.
4. Counsel latex-allergic client with positive history and skin tests on the risk of continued work in environments with high latex use.
5. Client referral to an allergist to increase understanding of latex allergy and prevent further sequelae.
6. Support client/client system toward appropriate goals; educate, reeducate, orient as needed.

Rationale: *Attain and maintain wellness and protect the client's reconstitution to return to wellness following treatment (Fawcett, 1995).

Primary Prevention

Intermediate Goals:

1. The client will acquire information regarding risk behaviours and prevention strategies.
2. Promote awareness/education re latex allergy with other health care providers.
3. Education on potential health risks related to latex sensitivity in areas of high glove usage.
4. Encourage hand-washing after glove removal to remove residual powder. Avoid touching eyes, noses and mouths while wearing gloves.
5. Mask when handling products containing latex to protect from airway exposure to airborne particles.
6. Clients with allergic contact dermatitis should have allergens identified by patch testing. Patch testing can detect delayed hypersensitivity responses to contact dermatitis.
7. Multidisciplinary latex allergy task force to develop policies and procedures for detection, care and education of all health care providers.

Rationale: *Awareness as intervention for prevention. *Reduce or change client reaction to stressors, and to prevent further penetration by stressor (Fawcett, 1995).

Future Goals:

1. Latex free hospital environment.
2. Mandatory labelling of latex rubber in medical devices.
3. Appropriate package labelling re: latex protein content of consumer goods.
4. Ongoing research for sensitive and specific serologic method for diagnosing latex sensitivity as skin-prick testing can cause anaphylactic reaction.
5. Epidemiologic surveillance funded to help identify i. the incidence and prevalence of latex allergy ii. the evolution of contact of systemic reactions iii. allergies to food that crossreact with latex

Rationale: *Decrease/eliminate environmental hazards. *Facilitate reconstitution of the lines of defence and rehabilitation of the functioning client system to prevent irreversible complications or degeneration (Fawcett, 1995).

Secondary Prevention

Intermediate Goals:

1. All suspected latex reactions reported immediately and evaluated.
2. Consultation service available for evaluation of latex allergic client.
3. Maintain a journal of exposures and responses to occupational exposure.
4. Do not rely on hypoallergenic claims of glove manufacturers.
5. Encourage the hospital to consider purchasing only CGSB certified gloves. [Canada has a voluntary medical glove certification program run by a standards testing agency called the Canadian General Standards Board-CGSB. The program reviews the aspects of glove quality].

Rationale: *Support positive factors toward wellness. *Provide advocacy by coordination and integration (Fawcett, 1995).

Future Goals:

1. Provide structure to maintain and enhance immediate and intermediate goals, i.e., establish continuous improvement/quality assurance programs to monitor ongoing goals.
2. Incorporate new research based interventions as they are developed.
3. Quality assurance programs to follow clients who develop latex allergy.
4. Track research and incorporate findings into primary prevention.

Rationale: *Support positive factors toward wellness. *Provide advocacy by coordination and integration (Fawcett, 1995).

Tertiary Prevention

Intermediate Goals:

1. Policies developed and reviewed regularly regarding occupational latex allergies.
2. Measures to be taken for latex-related illness.
3. Modified and alternate work sites identified when reallocating the allergic employee is required.
4. Encourage membership in Canadian Latex Allergy Association.

Rationale: *Support client/client system toward goals. *Coordinate and integrate health service resources (Fawcett, 1995).

Future Goals:

1. Provide structure to maintain and enhance immediate and intermediate goals, i.e., establish continuous improvement/quality assurance programs to monitor ongoing goals.

Rationale: *Support client/client system toward goals. *Coordinate and integrate health service resources (Fawcett, 1995).

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Nursing Goals and Nursing Outcomes Related to Latex Allergy

It is possible to determine the type of intervention required as well as the rationale to support the goals by utilizing the Neuman system and relating all the latex allergy factors affecting the nursing population. According to Neuman, the desired outcome goals to correct the variances from wellness must be negotiated with the client (Neuman, 1995). For example, a nurse who has not developed a sensitization to an allergen, but works in a high-risk area such as the operating room or labour and delivery, intervention should begin at the primary prevention-as-intervention level. The goal here would be to expand the flexible line of defence to offer greater protection against a stressor invasion. If the nurse presents with a contact dermatitis with or without a food allergy, intervention should begin at the secondary prevention level. Intervention at this level will minimize the allergic individual's subsequent exposure to the allergen. Once the cause of symptoms is established, it is possible to take appropriate actions to minimize them. If the individual has overt symptoms of sensitization and has completed latex allergy testing, with a positive diagnosis of latex allergy, intervention should begin at the tertiary level.

Evaluation

"The final step of the nursing process concludes when the results of intervention, termed outcome goals, are evaluated to confirm their attainment." (Fawcett, 1995).

Evaluation is an ongoing process and can serve as a systematic risk management approach to latex sensitivity with each phase categorized and evaluated as implemented. Risk management steps include risk identification, risk assessment, and risk control. Steps taken at each phase can be monitored for effectiveness of the risk management approach by eliciting the client's perspective in order to establish the success or failure of intervention (Neuman, 1995).

Interventions for evaluation in the latex sensitive client focus on primary prevention in order to sustain the basic structure and retain system stability. Neuman (1995) states that "nursing outcomes are evaluated continuously to determine if the plan of care needs to be changed." For example, new employees can be screened on induction of employment to determine individuals who fall into the "high risk" category of developing a latex sensitization/allergy. Long term

employees should not be overlooked and latex screening should be included in routine Occupational Health screening programs. (*A sample of a Latex-Allergy Screening Questionnaire, including 24 questions and a list of potentially allergy causing foods, is available in Sussman & Gold, 1996.*) The evaluation processes would be completed as a combined effort by the Occupational Health and Safety Department and the Latex Allergy Task Force. Statistics would include the percentage of nurses attending latex education sessions, reporting of signs and symptoms of latex sensitization, requests for information regarding latex allergy and the number of Latex Allergy Questionnaires completed and returned.

Other areas to evaluate include information gathered through the distribution and return of a Letter to Manufacturers. The letter would seek information regarding product latex content, and the increase/substitution of non-latex products versus latex products in the stores department. The Letter/Questionnaire to Manufacturers could state:

"As a result of documented incidents of anaphylactic reactions by patients and staff from exposure to natural rubber latex products, the Administration of (hospital/health care agency) has directed Materials Management to determine the natural rubber latex content of all items in the hospital inventory. We currently stock the following product, purchased from your company, as a hospital inventory item". (*See References for: Gegring, 1996, Letter to Manufacturers.*)

Nursing practice policies would be monitored and updated annually to reflect changes in practice. A concurrent total workplace environmental audit, including air sampling and product usage can be conducted in areas where a latex sensitive nurse has been identified.

It should be noted that evaluation could be complicated by nurses' unwillingness to report symptoms of latex exposure due to fear of losing their job.

Evaluation continues after confirmation of our outcome goals, and reformulation of goals may be necessary. For example, re-education through continuous inservicing programs may be required to meet our goals. These programs would constantly encourage nurses' participation in workplace latex-related issues. "Consequently, the client outcome acts as feedback for additional system input" (Fawcett, 1995.)

Summary

The documentation in this paper has proven that latex allergy is a major health issue for nurses. Many goals have been formulated to help nurses reduce the exposure of latex in their environment. Our goal should be to provide a latex safe working environment and efforts should focus on reducing latex exposure in the nursing population.

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