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CLINICAL BULLETIN

Hazards of Powdered Gloves

Powder is used as a lubricant in the manufacture of medical gloves in order to facilitate donning and to avoid blocking of the glove. Nowadays, the more widely used dusting powders are cornstarch that coats the glove inside, and calcium carbonate (CaCO3) that coats the outer surface.

Exposure to powder from medical gloves can cause a number of undesirable reactions for both healthcare workers and patients alike. For healthcare workers, the reactions caused by powdered gloves vary from well-known allergy symptoms and upper respiratory-tract disorders to pleuritis, myocarditis and irritation of the central nervous system.[1,2] For the patients, the reactions caused by powdered gloves includes the development of adhesions and granulomas, delayed healing and increased risk of surgical site infections.[3,4,5] The adverse effects of powdered gloves use are caused by the powder itself as this powder enters the patient's body during surgery and contaminates the wound, despite glove washing or wiping prior to undertaking the surgical procedure.[6] The wound retains a substantial amount of residual powder granules at the conclusion of the operation with the amount of residual granules found to be proportional to the number of powdered gloves used in the operating room, rather than directly related to whether the surgeon is using powdered or powder-free gloves. This is a critical issue as glove powder can act as a vehicle for opportunistic and pathogenic micro-organisms spread and potentially act as a food source for bacteria including MRSA and VRE, which increase the risk for post-operative wound infections.[6, 7]

The presence of powder in the wound may trigger a range of responses such as a delay in the healing process, alteration of the normal reparative process and an increase of the wound's inflammatory response. In addition, researchers have shown that the presence of glove powder significantly decreases the inoculum of bacteria required to produce abscesses.[6,8] This increases the surgical site infections occurrence risk, which poses a significant burden on the hospital budget.

Another common problem that can arise from the use of powdered gloves is the development of adhesions triggered by the increased inflammatory response, and granulomas.[3] Adhesions are the major cause of postoperative intestinal obstruction.[3] Uterine and fallopian tube adhesions, resulting from glove powder, are a significant risk of female infertility, which is the reason why powder-free gloves should be used even for routine vaginal examination.[3] These effects have been well documented not only in the peritoneal cavity and uterus, but reported in almost every anatomical site such as the eyes, cranial cavity, middle ear, and thorax among others.

One of the best documented consequences of the use of powdered gloves in the healthcare setting is the sensitization and development of diverse allergic reactions to natural rubber latex (NRL) such as upper respiratory tract symptoms or eye irritation. These reactions are not caused by the powder itself, but rather by its capacity to bind with NRL protein antigens. These allergen/protein coated powder particles can be aerosolized when the gloves are donned or removed, thus contaminating the hospital environment. Powdered latex gloves aerosolize more latex proteins into the air than any other medical product in a hospital and those hospital areas where powdered gloves are used have 300 times more aerosolized latex proteins that areas of powder-free usage.[9]

The inhalation or ingestion of these powder particles can remain in the air, on instruments and equipment for many hours, and can lead over time to the development of sensitization and allergies.[9] A decrease in the number of healthcare workers with suspected NRL allergy including occupational asthma and contact urticaria when powdered gloves are substituted by powder-free gloves has been reported.[10,11]

This is not surprising if we take into account that it is estimated that the use of powdered gloves will deposit in excess of 2kg of glove powder per year per theatre.

The presence of glove powder can result in many other undesirable effects, such as the contamination of catheters, perfused donor kidneys and cosmetic dentistry materials (crowns, prostheses) among others.[2]

All the issues outlined in this article can be easily reduced by switching from a powdered to a powder-free environment. This may have additional cost-savings in reduced healthcare personnel sickness and post-operative complications.

Also, it must be stated that the cost of washing surgical powdered gloves prior to use, has been reported as being at least seven times higher than the cost of using powder-free gloves[2] while at the same time being inefficient in totally removing the glove powder.[12]

The documented adverse effects caused by the use of powdered gloves are the reason for a global decrease in powdered gloves usage, and a shift towards powder-free gloves. This is highlighted by the discontinuation in the purchase of powdered gloves by some countries such as Germany in 1997 and UK in 2000 and the increasing number of hospitals that have internal policies to use only powder-free gloves such as the renowned USA Mayo Clinic and John Hopkins Hospital. This evolution is set to accelerate, as the FDA has announced a proposal to ban powdered gloves in the United States. Covering powdered surgical and examination gloves, the ban is expected to come into effect late 2016.

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