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## Red spots among flight attendants: Observation — a valuable investigative tool

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**The National Institute for Occupational Safety and Health and the Bureau of Epidemiology of the Center for Disease Control investigated episodes of red spots appearing on the skin of flight attendants during various Eastern Airlines flights in the first three months of 1980. Review of 132 cases reported during January and February showed that 91 different flight attendants had been affected; 96% of cases had occurred on flights between the New York and Miami metropolitan areas, and 90% on a single type of aircraft. Although some reports mentioned burning, nausea, and headache in association with spots, most reports involved only the occurrence of bright red spots that could be wiped or washed off. Studies of work practices and procedures of flight attendants revealed that the red spots were caused by red ink flaking off the life vests during demonstrations of the use of the vests in preflight safety instructions. The demonstration vests were labelled with ink containing a litholrubine chrome molybdate orange pigment. Following removal of the implicated vests from all Eastern Airlines aircraft, no further cases have appeared.**

### introduction

The National Institute for Occupational Safety and Health (NIOSH) received a request from the Air Transport Division of the Transport Workers Union of America to conduct a Health Hazard Evaluation concerning the appearance of red spots on the skin of Eastern Airlines flight attendants (FA's) during various flights.<sup>(1)</sup> During January 1 to March 11, 1980, there were approximately 140 reports of red spots occurring among these FA's. The spots were reported to be small drops of red liquid that were noticed mainly during or shortly after flights between the New York and Miami metropolitan areas. Complaints of symptoms accompanying the spots were rare, but some FA's expressed concern that the spots were caused by bleeding through the skin and might indicate a serious health hazard. On March 12, investigators from NIOSH and the Bureau of Epidemiology began an investigation of the problem.

### background

Eastern Airlines medical personnel had examined several persons with the red spots and had obtained swabs and scrapings as clinical specimens. No evidence of damage to underlying skin was noted on these examinations, nor was any damage noted by a consultant dermatologist who examined affected FA's after the spots had disappeared. Chemical tests on clinical specimens for the presence of blood were negative. Bacteriological tests for red type bacteria were also negative. Airline personnel had investigated the ventilation systems, cleaning materials and procedures, and other environmental factors on affected aircraft. Airflow patterns and cabin temperatures, pressures, and relative

humidity were found to be normal. Cleaning materials and routines had been changed, but cases had continued to occur.

### health hazard evaluation

A review of 132 cases occurring in January and February showed that 91 different FA's had been affected, 68 once and 23 more than once. Of these cases, 119 (90%) had occurred on a single type of aircraft. Of the 119 cases from the implicated aircraft, 96% had occurred on north and south bound flights between the New York City and Miami metropolitan areas, flights that are partially over water. Only rarely was a case reported from the same airplanes when flying transcontinental or on other east-west routes. Because red spots on the skin are common, we established a case definition to be "the occurrence of red spots which could be smeared or wiped off." Using this case definition, further analysis showed that there was no correlation between individual attack rates and measures of long-term exposure to aircraft environments; FA-passenger ratios; work station of FA during flight, i.e., galley area, forward vs. rear cabins; kind of foods eaten before or during flights; types of cosmetics used; aircraft load factors; and aircraft maintenance history.

To identify potential environmental sources of the red-colored substance, we observed the standard work practices and procedures of FA's on board the implicated aircraft. At the beginning of each flight, FA's routinely demonstrated the use of life vests required for emergency landings over water. Usually the senior FA makes the announcement, while the junior staff demonstrates the emergency equipment. Because the vests used for demonstrations were not actually functional, they were stenciled with bold red stripes and the words "DEMO ONLY." In the process of donning and removing the vests, the red ink came in close contact with the face, neck, and hands of the demonstrator. Noting that the ink rubbed or flaked-off easily, we obtained a sample from the vests to elicit a typical clinical picture. This was accomplished by applying the ink particles to the skin of an investigator, which resulted in the appearance of red spots identical to those reported. Observation by FA's of the mock demonstrations confirmed the benign nature of the clinical condition. The apparent association was further confirmed by a re-analysis of the case showing that junior FA's had the highest attack-rates of red spots.

In order to verify the association between vests and cases, we recommended that the airline remove all demonstration model life vests with red markings from its aircraft and instruct FA's to use the standard, functional passenger vests for demonstration purposes. Since removal of the vests, no new cases have been reported. Chemical analysis of swab samples of the red substance found on the faces and hands of

the affected FA's matched that of the ink from the model vests. The ink contained two conventional pigments dispersed in an organic polymeric vehicle serving as the binder system. The pigments included chrome molybdate orange and lithol rubine. The binder was composed of a nitrocellulose lacquer and a rosin modified phenolic resin.

There is no evidence of skin abnormalities or of other health hazards in FA's who have had the red spots on their skin during these episodes.

#### comment

This case-report underscores the value of observation as a basic component of the scientific method employed by industrial hygienists and physicians to evaluate occupational health problems.<sup>(2)</sup> The importance of observation was espoused by Ramazzini almost three hundred years ago.<sup>(3)</sup> He wrote "I for one have done all that lay in my power, and have not thought it beneath me to step into workshops of the meaner sort now and again and study the obscure operations of mechanical arts . . ." Thus, this paper

is not to leave the impression that a new truth has been discovered, but to remind us that observation is a valuable investigative tool and sometimes may be sufficient to provide the answer to the problem under consideration.

#### acknowledgments

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