

# Parasitic Disease Control in a Residential Facility for the Mentally Retarded: Failure of Selected Isolation Procedures

STEPHEN B. THACKER, MD, ANN M. KIMBALL, MD, MARTIN WOLFE, MD,  
KEEWHAN CHOI, PHD, AND LORETTA GILMORE, MD

**Abstract:** Asymptomatic infection with either *Entamoeba histolytica* or *Giardia lamblia* was found in 60 per cent of the residents in an institution for the mentally retarded one year after eradication of these parasites. The residents were then segregated into infected and noninfected groups and drug therapy was again successfully undertaken. The two groups remained separated except during periods of play. A one-year follow-up showed that both study and control groups were equally infected. The failure of segregation was confounded by patient age and infection with nonpathogenic parasites. (*Am J Public Health* 1981; 71:303-305.)

Amebiasis and giardiasis cause significant morbidity and mortality among residents of institutions for mentally retarded persons.<sup>1-5</sup> A one-year follow-up study of therapeutic, educational, and environmental intervention during 1977-78 at such a facility in Washington, DC showed a return to preintervention levels of infection with *Entamoeba histolytica* and *Giardia lamblia* following successful therapy.<sup>5</sup> The study indicated that the source of reinfection was person-to-person transmission among the residents and not the staff or the water supply. A second investigation was undertaken in June 1978 to determine the potential salutary effect of segregating infected from noninfected children in combination with appropriate drug therapy.

The dormitory housed in five wards 28 boys and 10 girls from 9 to 20 years of age with profound mental retardation (I.Q. < 25). Although the children rarely left the building, some attended special off-campus programs. The newest resident of the dormitory had lived there for nearly two years.

## Methods

Three stool specimens were obtained from 38 residents of the study dormitory in May and June of 1978. The labora-

Address reprint requests to Stephen B. Thacker, Chief, Consolidated Surveillance and Communications Activity, Bureau of Epidemiology, Center for Disease Control, Atlanta, GA 30333. Dr. Kee-whan Choi is Mathematical Statistician in this same Activity; Dr. Kimball is an Epidemic Intelligence Service Officer at Community Health and Hospitals Administration, with the Government of the District of Columbia; Dr. Wolfe is with the Parasitology Laboratory of Washington, DC; and Dr. Gilmore is with the D.C. Children's Center in Laurel, MD. This paper, submitted to the Journal April 24, 1980, was revised and accepted for publication October 29, 1980.

tory procedures used have been described previously.<sup>5</sup> Treatment of those positive for *E. histolytica* and/or *G. lamblia* was initiated in June 1978.\* The residents were subsequently separated into study groups that were positive for either *E. histolytica* and/or *G. lamblia* and a control group that did not have pathogenic parasites in three successive stools. These groups were segregated during eating and sleeping and had separate toilet facilities. The groups intermingled at play. There was no evidence of symptomatic diarrhea at the time of the study. Follow-up stools were obtained in May and June of 1979 from the 35 residents who remained in the dormitory. Three residents, two cases and one control, moved from the dormitory during the study period, and were omitted from all calculations.

## Results

Twenty cases were treated according to the study protocol. One month after therapy all but one were found to be negative for pathogenic parasites in three successive stools collected one week apart. The single therapeutic failure was a cyst carrier for *E. histolytica* who was treated successfully with diloxanide furoate (20 mg/kg of body weight/24 hours in three divided doses  $\times$  10 days). Six of these residents (30 per cent) were found to be infected with either *E. histolytica* and/or *G. lamblia* at the time of follow-up in June 1979 (Table 1). At the same time, 6 (40 per cent) of 15 controls were found to have amebiasis in June 1979 (Table 1).

Two confounding factors prevented precise evaluation of the independent effect of segregation on disease control. First, the untreated residents  $\geq$  14 years of age were less likely to become reinfected than younger residents although the opposite trend was noted in the study group (Table 2). In addition, residents who had nonpathogenic parasites (*Entamoeba hartmanni*, *Entamoeba coli*, *Endolimax nana*, or *Iodoamoeba butschlii*) were more likely to have become infected with pathogenic parasites at follow-up examination (37 per cent vs 25 per cent), although this trend was not statistically significant (Table 3). Because of the small numbers in this study, it was impossible to apply appropriate statistical techniques (e.g., log linear analysis) to evaluate the ef-

\*A resident found to have stools positive for *E. histolytica* or *G. lamblia* was treated with diiodohydroxyquin (650 mg, TID  $\times$  20 days) or quinacrine hydrochloride (100 mg, TID  $\times$  7 days), respectively. Patients with mixed infection were treated with metronidazole (35-50 mg/kg of body weight/24 hours, in three divided doses  $\times$  10 days). Therapeutic failures were treated with metronidazole.

**TABLE 1—Results in 1979 of Segregating Mentally Retarded Institutional Residents with Stool Pathogens\* in 1978 from Residents without Pathogens in 1978**

Cases and Controls	N	Outcome in 1979		
		<i>E. histolytica</i>	<i>G. lamblia</i>	Both
Residents with Pathogens in 1978	20	3	1	2
Residents without Pathogens in 1978	15	6	0	0

\**Entamoeba histolytica*, *Giardia lamblia*

fects on reinfection of age and infection with nonpathogenic parasites.

### Discussion

Although *E. histolytica* and *G. lamblia* can be spread in water and possibly food, person-to-person spread is thought to be the primary mechanism of transmission in institutions. A previous report showed a low rate of transmission (< 5.0 per cent) in the staff of the study facility.<sup>5</sup> That study also suggested that poor personal hygiene of young children may have frustrated earlier attempts at disease control. The study reported here suggests that the type of segregation practiced, even in the presence of appropriate therapy, does not interrupt transmission. Although isolation was imperfect, the data raise the question that inadequate separation may not have been the key factor in this study. Instead the most important risk factors for infection with pathogenic parasites may have been the age of the child and the presence of any parasite in the stool. The association of decreasing infection with increased age may be an indirect measure of improved

**TABLE 2—Comparison of the Impact of Segregation Procedures on Young and Old Residents of a Washington, DC Institution for the Mentally Retarded, 1978-79**

	Outcome in 1979		
	With Pathogens	Without Pathogens	Total
<i>Residents with Pathogens* in 1978</i>			
<14 years of age	4	12	16
≥14 years of age	2	2	4
TOTAL	6	14	20
<i>Residents without Pathogens in 1978</i>			
<14 years of age	4	3	7
≥14 years of age	2	6	8
TOTAL	6	9	15

\**Entamoeba histolytica* and *Giardia lamblia***TABLE 3—Comparison of the Impact of Segregation on Residents Infected with Pathogenic\* and Nonpathogenic\*\* Parasites, of a Washington, DC Institution for the Mentally Retarded, 1978-79**

	Outcome in 1979		
	With Pathogens	Without Pathogens	Total
<i>Residents with Pathogens in 1978</i>			
Nonpathogens present	4	8	12
No nonpathogens	2	6	8
TOTAL	6	14	20
<i>Residents without Pathogens in 1978</i>			
Nonpathogens present	6	9	15
No nonpathogens	0	0	0
TOTAL	6	9	15

\**Entamoeba histolytica* and *Giardia lamblia*

\*\*See text

levels of social skills. Unfortunately, data on functional skills were not available at the dormitory. The higher rate of acquisition of pathogenic parasites among those with nonpathogenic parasites in their stools suggests that these nonpathogens are either an indicator that pathogens were not detected, or reflect behaviors that foster the acquisition of disease. In order to adequately study the effect of selective isolation of infected persons, a large study is required in which one controls for age and the presence of nonpathogens in the stool. Such a study might require isolation of children harboring nonpathogens.

Given the current understanding of parasitic disease in residents of institutions, we are left with the following options:

1. Do not intervene in asymptomatic patients with the realization that many patients are subclinically ill or may not be able to express their discomfort.
2. Increase staffing to compensate for behaviors that put children at risk for parasitic diseases.
3. Evaluate alternative interventions such as periodic mass chemotherapy and segregation of infected individuals.

If an institution chooses to pursue one of the last two options, the benefit (control of parasitic disease) must outweigh the personal and administrative changes necessary to effectively implement the chosen interventions. Only carefully designed studies will provide the basis for rationally choosing an option other than nonintervention.

### REFERENCES

1. Krogstad D, Spencer H, Healy G, et al: Amebiasis: epidemiologic studies in the United States, 1971-1974. *Ann of Int Med* 1978; 88:89-97.
2. Brooke MM, Wilcox DE, Daiser RL, et al: Investigation of factors associated with the decline of intestinal protozoa in a Kansas mental institution. *Am J Hyg* 1962; 76:52-60.
3. Yoeli M, Most H, Hammond J, et al: Parasitic infections in a

closed community. *Trans R Soc Trop Med Hyg* 1972; 66(5):764-776.

4. Brooke MM: Epidemiology and control of amebiasis in institutions for the mentally retarded. *Am J Mental Defic* 1963; 68:187.
5. Thacker SB, Simpson S, Gordon TJ, *et al*: Parasitic disease control in a residential facility for the mentally retarded. *Am J Public Health* 1979; 69:1279-1281.

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## Female Laundry and Dry Cleaning Workers in Wisconsin: A Mortality Analysis

RONALD M. KATZ, BS, AND DAVID JOWETT, PHD

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**Abstract:** The mortality patterns of 671 female laundry and dry cleaning workers for the period 1963-1977 were analyzed, using Wisconsin death certificate data. Results fail to show an overall increase in malignant neoplasms, but elevated risk was found for cancers of the kidney and genitals (unspecified), along with a smaller excess of bladder and skin cancer and lymphosarcoma. (*Am J Public Health* 1981; 71:305-307.)

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### Introduction

Blair, *et al*, reporting data on causes of death among laundry and dry cleaning workers in St. Louis, suggest an elevated cancer risk resulting from multiple exposures to various dry cleaning fluids, including tetrachloroethylene, carbon tetrachloride, trichloroethylene, and other petroleum solvents.<sup>1</sup> Tetrachloroethylene, which since 1950 has been the primary dry cleaning fluid in the United States, has been found to cause an increase in hepatocellular carcinomas in laboratory rats.<sup>2</sup> Human exposure can cause kidney and liver abnormalities, irritation of eyes and upper respiratory tract, together with symptoms associated with central nervous system depression—fatigue, nausea, drowsiness and memory impairment.<sup>3</sup> As part of an ongoing study of female occupational mortality in Wisconsin, we analyzed the death certificate records of 671 female laundry and dry cleaning workers for the period 1963-1977. The relative risks for 25 major causes of death were evaluated, comparing laundry and dry cleaning workers with other female workers. Dry cleaning workers, who are more likely to experience chemical exposures, could not be separated from laundry workers because they share the same occupational code.

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Address reprint requests to David Jowett, PhD, Professor, Science and Environmental Change, Computing and Data Services, University of Wisconsin, Green Bay, WI 54302. This paper, submitted to the *Journal* August 11, 1980, was revised and accepted for publication October 28, 1980.

### Materials and Methods

Of the 247,800 coded death certificate records obtained from the Wisconsin Bureau of Health Statistics, less than 1 per cent lacked an occupational statement. Consequently, the data represent an excellent population for the analysis of occupational mortality. Information on marital status, occupation, age at death, year of death, and underlying cause of death was abstracted for all white females 18 years and older. Non-white females made up less than 3 per cent of the total, and were therefore omitted for the sake of homogeneity. Approximately 160,000 records with occupation listed as housewife were omitted from the data file to minimize confounding factors arising from the comparison of employed individuals with those showing no history of employment. The final data file consisted of 66,230 death records. A program was written to conform the 7th and 8th revisions of the International Classification of Diseases to a single usable code, following which 671 records representing laundry and dry cleaning workers were identified. The age distribution of these workers cross classified with year of death is shown in Table 1.

The basic analysis consisted of testing for associations between occupation and cause of death by calculating cause-specific proportionate mortality ratios (PMRs) for 25 major causes of death. Mortality of laundry and dry cleaning workers was compared to that for all other working females during the same time period using the Mantel-Haenszel chi-square with one degree of freedom. Age at death and marital status were used as control variables by generating PMRs for specified levels of each. Appreciable changes in PMR could not be attributed to either, and the results are not reported here, nor are the death rates age adjusted.

Blair, *et al*, observed that laundry and dry cleaning workers are generally low paid, and that differences in mortality patterns may be due to differences in socioeconomic status.<sup>1</sup> Consequently, we compared laundry and dry cleaning workers with both the entire population of working females and with a population derived from other low wage occupations. This group consisted primarily of occupations listed under the categories of service workers and operatives (Census Codes 612-890) of the U.S. Census Classification Code.