PRIMARY CARE AND THE PATTERN OF DISEASE IN A RURAL AREA OF THE ARGENTINE CHACO

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An informal study was conducted in 1979-1980 to define disease patterns among patients at a missionary clinic in the Chaco region of Northern Argentina. This article reports the results of that study.

Introduction

Little information has been published on disease patterns and delivery of primary care in the Chaco region of Northern Argentina. This article describes the life-style of a rural community of Indians, Creoles, and mestizos living in the Chaco; tells about the primary care program operating in the area; and reports the results of a study on disease patterns among the outpatients at a rural clinic. The purpose of the study was to document community health problems. Formal statistical analyses were not possible, given the limited resources available, and so a descriptive study was undertaken.

The Area and Population

The Gran Chaco region (see Figure 1) covers parts of Northern Argentina, Paraguay, and Bolivia. It is a roughly rectangular area encompassing approximately 1,500 km on a north-south axis and 650 km on an east-west axis. The Andes form the western boundary of the region, which includes portions of two roughly parallel rivers, the Pilcomayo and the Bermejo.

The Chaco, whose vegetation consists of scrub and small forests, is the homeland of some 50,000 Indians belonging to nine different tribal groups. Driven into this inhospitable territory by warfare of bygone days, the Indians now live in small settlements (1). In addition, families of Creoles (people of European descent) and mestizos (of mixed European and Indian descent) live on smallholdings throughout the region. The people in these latter groups have similar life-styles; the mestizos are similar in physical appearance to the Indians.

By tradition, the Chaco Indians are mainly nomadic hunters, fishers, and gatherers having little involvement with agriculture (2). Their diet consists principally of river fish, algaroba (carob) beans, and various naturally-occurring fruits gathered seasonally. Because the land has grown more arid and the population has increased, life has become progressively more difficult. Some Indian families make a small income by providing casual labor in distant towns or by selling fish and handmade goods.

Housing conditions and water supplies are inadequate in most of the Indian communities. The traditional brush hut offers poor protection against sandstorms or heavy rains, and the hut’s brush walls commonly harbor vinchuca, triatomid bug vectors of Chagas’ disease. (Adobe houses with metal roofs are gradually being built in some villages.) Many Indian communities and Creole settlements have no safe drinking-water supply or means of sewage disposal. Instead, contaminated river water is used for all the daily needs of the people.

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1. Also appearing in Spanish in the Boletín de la Oficina Sanitaria Panamericana, 96(8), 1984.
2. Medical Officer, South American Missionary Society.
Most of the Creole and mestizo smallholders are more prosperous than the Indians. They live in adobe houses and usually travel to nearby towns more often. Sale of livestock and animal skins provides them with an income, and they cultivate maize on many of their farms. The staple diet of most families consists of goat meat, bread, and pasta.

Small schools financed by the provincial government have been built in some Chaco villages. Staffed by Spanish-speaking Argentine teachers, they are attended by Indian, Creole, and mestizo children. Only primary education is provided.

In 1979-1980 the author was based at the Indian village of La Paz (see Figure 1) in Argentina's Salta Province. The village is situated in a hot, dry, and dusty part of the
Chaco bush country, beside the Pilcomayo River. Most of the Indians in La Paz and the surrounding communities belong to the Mataco tribe; the others are Chorotes, Chunchupis, or Tobas. Though each tribe has its own language, Spanish serving as a common language is increasingly spoken.

Primary Care

Primary health care in Northern Argentina’s portion of the Chaco is provided by a few scattered dispensaries and small clinics, as well as by multipurpose health agents who have been introduced into the area in recent years. No primary care services were available in the region around La Paz until the early 1960s. At that time the Anglican Church of Northern Argentina started a social development program incorporating medical and agricultural activities. The program’s aims included providing cleaner drinking water and improving nutrition by encouraging the cultivation of fruits and vegetables. Medical activities given particular priority included vaccination, treatment of communicable diseases (especially tuberculosis), and health education. Overall, the medical side of the program pursued a strategy of training local personnel as primary care workers for the Indian villages and Creole settlements, while also encouraging the provincial government to provide a health service so that missionary medical personnel and funding would no longer be required.

An adobe clinic building was erected in 1970. This facility contained a general-duty room, a physician’s consulting room, a dentist’s room, a three-bed maternity unit, and a small pharmacy. A separate laboratory employed a microscope, used mainly for the sputum diagnosis of tuberculosis, and performed the Huddleson test for brucellosis. Urinalysis was performed by using Multistix (plastic test strips to which several chemical reagent areas are affixed). Cervical smears and sputum cultures (for cervical cancer screening and detection of tubercule bacilli) were sent periodically to a laboratory in Salta, the provincial capital.

The clinic provided services mainly for outpatients, but a small number of maternity cases were admitted. Most of the patients were residents of La Paz and nearby villages, but others traveled long distances by foot, bicycle, or horseback—some crossing the river from Paraguay—to receive medical attention. In all, the clinic served an area of approximately 5,000 square kilometers with a population of approximately 4,000 Indians and 1,000 Creoles and mestizos. The nearest hospital was some 200 kilometers away in the town of Tartagal, and the journey over dirt roads to reach it took a minimum of five to seven hours by truck. For this reason an airborne “ambulance” summoned by a church radio transmitter network and sent by the Ministry of
Brush huts in the Indian village of La Paz (above), and patients waiting outside the La Paz clinic (below).
Health from Salta was occasionally used to transfer emergency cases to the Salta hospital.

The health personnel involved saw most of their patients at the clinic, but they also made some domiciliary visits and occasionally visited other villages. (Boxes of the most frequently administered drugs were taken on these trips.) In addition, part of their preventive work involved providing regular lessons at the La Paz school on the basic principles of health and hygiene.

As of this writing (October 1983), the goals of this primary care program have been partly achieved. Childhood mortality from diseases preventable by vaccination has declined dramatically. Although many villages still lack a safe water supply, clean drinking-water is now available from wells in several villages. Since 1970, Argentine medical personnel have gradually been integrated into a health service provided by the provincial government—a development that enabled the missionary medical staff (a physician, a nurse-midwife, and a dentist) to depart the area in 1981—and several village dispensaries have been set up, each staffed by a government-paid auxiliary nurse. In addition, since the early 1970s a small clinic has existed at Santa Victoria, between La Paz and Tartagal; this clinic is staffed by two Argentine physicians. Finally, the national Rural Health Program has reached the Chaco, and since 1975 this program has been providing primary care services through multipurpose health agents.

Rural health activities have been promoted in Argentina in recent years through the services of these multipurpose health agents, who are members of the communities they serve (3). During the period of the present study (June 1979-May 1980) 12 such health agents were supervised by physicians at the Santa Victoria clinic. These agents had attended an initial training course at a larger health center, and their training had been continued via intermittent refresher courses.

Two of the health agents were Indian men who lived in La Paz and traveled by bicycle to the surrounding villages and smallholdings. Their preventive primary care work included maternal and child health activities, disease surveillance, and health education.

Through the work of the multipurpose agents, virtually all infants in the area served were immunized against diphtheria, whooping cough, tetanus, poliomyelitis, tuberculosis, and measles. Booster immunizations against tetanus, diphtheria, and tuberculosis were given later in childhood. In addition, all pregnant women were immunized against tetanus and diphtheria. The vaccines were kept refrigerated at the La Paz clinic and were transported in insulated boxes.

The health agents also periodically recorded the weights and heights of children up to two years of age. Any child failing to thrive was referred to the clinic for medical examination and was given daily supplemental food if necessary. In the course of monthly visits, the health agents provided health education and distributed milk powder to children under two years of age, to pregnant women, and to all patients with tuberculosis. They also reported details about any patients thought to require medical treatment to the medical staff at the clinic. (Often a simple remedy was sufficient, and it was thus unnecessary for the patient to travel to the clinic.) The agents delivered medications to patients with tuberculosis and periodically took samples of their sputum to the clinic laboratory for microscopic examination. Sputa from all contacts of new cases were also examined.

The 1979-1980 Study

Materials and Methods

Data for the study reported here were gathered from 1 June 1979 to 31 May 1980, except for several short periods when the physician responsible was absent from the La Paz area. Data were gathered on patients (including some Paraguayans) attending the La Paz clinic, on La Paz patients seen during domiciliary visits, and on patients seen during trips to surrounding villages. In addition to the clinical
notes about each patient, information was obtained from consultation forms recording the patient’s name, age, sex, and place of residence; the date of the consultation; the diagnosis; and whether the consultation in question represented a first visit or a follow-up visit for the same problem.

The patients were divided into two groups, Indians and “Creoles” (actually Creoles plus mestizos), for purposes of analysis. The Creoles and mestizos were grouped together because of similarities in their life-styles and because it was often impossible to tell members of the two subgroups apart. For brevity, people in this combined group are hereafter referred to as “Creoles.”

Data on Indians and Creoles were assessed separately in order to determine whether there were any differences in the health problems of these two groups.

The patient diagnoses involved were grouped into the following categories: respiratory diseases; gastrointestinal diseases; skin infections; obstetrics, gynecology, or genito-urinary infections; musculoskeletal complaints; and “other conditions” including systemic infections. The diagnoses used were based on the patients’ clinical histories and examinations rather than upon laboratory data, because few laboratory investigations were performed. If a patient was diagnosed as having more than one ailment, each was recorded as a separate diagnosis.

**Results**

Table 1 shows the numbers of Indians and Creoles given initial and follow-up consultations and the numbers of diagnoses involved. More than one diagnosis was made for 50 Indians (4%) and 40 Creoles (7%) during the initial consultation. The number of follow-up consultations depended on several factors, including the patient’s place of residence and motivation, as well as the severity or chronicity of the health problem.

Figure 2 shows the percentage distribution—by age, racial group, and sex—of patients presenting with a health problem for the first time. Using these initial consultations as the basis for analysis, without including follow-up consultations, avoids the double-counting biases inherent in using the total number of consultations. Overall, considerably more women than men were seen in the 15-39 age group—a difference that applied both to Indians and Creoles and that could be attributed largely to the number of prenatal patients. (In all, as Figure 3 shows, 14.8% of the initial Indian consultations and 16.5% of the initial Creole consultations were classed as involving “obstetrics, gynecology, or genito-urinary infections.” The majority of patients in this group were prenatal patients.)

Figure 3 also shows that respiratory diseases accounted for by far the largest single share of consultations. Nearly half of these disease

<table>
<thead>
<tr>
<th></th>
<th>Indians</th>
<th>“Creoles”</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of patients</td>
<td>No. of diagnoses</td>
<td>No. of patients</td>
</tr>
<tr>
<td>Initial visits</td>
<td>1,157</td>
<td>1,207</td>
<td>608</td>
</tr>
<tr>
<td>Follow-up visits</td>
<td>619</td>
<td>735</td>
<td>218</td>
</tr>
<tr>
<td>Total</td>
<td>1,776</td>
<td>1,942</td>
<td>826</td>
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Figure 2. The age distribution of male and female patients seen for the first time by members of the La Paz clinic staff during the study period, by racial grouping.

<table>
<thead>
<tr>
<th>Age Group in Years</th>
<th>INDIANS</th>
<th>CREOLES</th>
</tr>
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<tbody>
<tr>
<td>Under 5</td>
<td>18.0</td>
<td>12.2</td>
</tr>
<tr>
<td>5-14</td>
<td>29.6</td>
<td>19.1</td>
</tr>
<tr>
<td>15-39</td>
<td>33.9</td>
<td>25.8</td>
</tr>
<tr>
<td>40-64</td>
<td>18.0</td>
<td>19.1</td>
</tr>
<tr>
<td>65+</td>
<td>4.4</td>
<td>12.2</td>
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<thead>
<tr>
<th>Age Group in Years</th>
<th>INDIANS</th>
<th>CREOLES</th>
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<tr>
<td>Under 5</td>
<td>23.6</td>
<td>16.6</td>
</tr>
<tr>
<td>5-14</td>
<td>15.7</td>
<td>12.0</td>
</tr>
<tr>
<td>15-39</td>
<td>50.8</td>
<td>45.2</td>
</tr>
<tr>
<td>40-64</td>
<td>16.8</td>
<td>15.4</td>
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<tr>
<td>65+</td>
<td>2.4</td>
<td>2.4</td>
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</tbody>
</table>

Cases (44%) occurred in children under 10 years old, most of whom had acute infections or coughs. It may be relevant to note, however, that the clinic was the social center of the village, that mothers and babies tended to gather there, and that coughing with little or no evidence of respiratory infection was a fairly common presenting symptom in young children. Also, as Figure 2 indicates, Indian children under five years old accounted for a larger share of all patients in their racial grouping than did Creole children under five.
Figure 3. Conditions diagnosed among patients seen by members of the La Paz clinic staff during the study period, according to data abstracted from the clinic physician’s records.

INITIAL CONSULTATIONS

- Indians (n = 1207)
  - 17.7% Respiratory diseases
  - 5.9% Gastrointestinal diseases
  - 14.8% Skin infections
  - 8.7% Obstetrics/Gynecology/G-U infections
  - 15.0% Musculoskeletal disorders
  - 37.9% Other conditions

- Creoles (n = 648)
  - 25.8% Respiratory diseases
  - 28.5% Gastrointestinal diseases
  - 9.8% Skin infections
  - 10.6% Obstetrics/Gynecology/G-U infections
  - 8.9% Musculoskeletal disorders
  - 16.5% Other conditions

COMBINED INITIAL AND FOLLOW-UP CONSULTATIONS

- Indians and Creoles (n = 2887)
  - 19.5% Respiratory diseases
  - 34.0% Gastrointestinal diseases
  - 7.9% Skin infections
  - 19.5% Obstetrics/Gynecology/G-U infections
  - 11.7% Musculoskeletal disorders
  - 7.4% Other conditions

Key:
- Respiratory diseases
- Gastrointestinal diseases
- Skin infections
- Obstetrics/Gynecology/G-U infections
- Musculoskeletal disorders
- Other conditions

years old—perhaps partly reflecting the fact that Indians living in La Paz had relatively easier access to the clinic.

It should also be noted that the large group of respiratory disease patients shown in Figure 3 includes all of the patients with tuberculosis. Nearly all of these patients were Indians, and they were examined regularly. The first-line medications used were streptomycin, ethambutol, and isoniazid. Therapy was discontinued after 18 months if the patient’s sputum was free of tubercle bacilli. At the beginning
of the study, 96 tuberculous patients were undergoing treatment.

Regarding gastrointestinal diseases, a large share of both Indian and Creole patients had chronic diarrhea, which was often caused by intestinal parasites. Since the causative agent was seldom known, broad-spectrum anthelminthic medications were prescribed first. These were usually effective; but if symptoms persisted, more specific drugs against *Giardia*, *Amoeba*, *Ankylostoma*, *Enterobius*, or *Taenia* were administered. In general, treatment of diarrhea was mainly requested for young children, especially during bouts of acute diarrhea. In the vicinity of La Paz, dehydration of acute diarrhea patients was effectively prevented by having mothers give their children plenty of clinic-supplied boiled water. Small amounts of sugar and salt were added to the water. Only six Indian children were sufficiently malnourished to require daily food supplements.

As already mentioned, the third-largest group of patients (that with diagnoses involving "obstetrics, gynecology, or genitourinary infections") was composed mainly of prenatal cases. The other patients in this group were women requesting family planning services and a few patients of both sexes with genitourinary infections. The clinic staff assisted with 52 births during the twelve-month study period. Birth-weights ranged from 2,200g to 4,400g. Obstetric complications were surprisingly few—particularly among Indian women, for whom episiotomies were seldom required. Most women arrived at the clinic in well-advanced labor and stayed for less than 24 hours. There was a high demand for birth control methods, intrauterine contraceptive coils and the combined pill (containing estrogen and progestogen) being found generally acceptable.

Skin infections, especially pediculosis capitis in children and scabies, were very common in the area, yet relatively few patients sought treatment. (As shown in Figure 3, only 7.4% of all consultations were for skin infections, but the prevalence of these infections appeared to be much higher.) Scabies infections in young children were often spread widely over the body, and secondary bacterial infection sometimes occurred. Penicillin or ampicillin were effective antibiotics in such cases, in combination with specific antiscabies therapy. However, the infection frequently recurred because of difficulties in eradicating the parasite from clothing and blankets.

Musculoskeletal complaints included myalgia, low back pain, and arthritis (both rheumatoid arthritis and osteoarthritis as determined by clinical criteria). There were also a few trauma cases with fractures, most of which were sent to the Tartagal or Salta hospitals for X-rays and treatment.

"Other conditions" diagnosed (see Figure 3) included certain infectious diseases (including brucellosis, Chagas’ disease, rheumatic fever, and hepatitis), disorders of the nervous and cardiovascular systems, cancers, obesity, and diabetes mellitus. Of the infectious diseases in this category, brucellosis was quite common in the area—mainly among Creoles, since the infection was acquired from goats. Occasional cases of acute Chagas’ disease were also diagnosed. In addition, blood samples were occasionally sent to the provincial capital for investigation of other disorders, and an assay for Chagas’ disease was routinely included in the investigations. In most cases this assay was positive, indicating that many people were asymptomatic carriers of the Chagas’ disease agent, *Trypanosoma cruzi*.

A few cases of rheumatic fever with endocarditis were also detected; patients with this condition were given a regimen of monthly prophylactic penicillin injections until reaching 18 years of age, in accordance with provincial health policy. In addition, a few cases of infectious hepatitis were diagnosed. Infectious “tropical” diseases were rare, although one case each of pulmonary blastomycosis, leishmaniasis, and guinea-worm infection (with prior hospital diagnosis) were recorded. No cases of malaria, yellow fever, schistosomiasis, or leprosy were diagnosed.

Disorders of the nervous and cardiovascular systems were seen infrequently. The common-
The most symptom was nonassociated headache. Two patients with epilepsy were taking anticonvulsants. A few Creoles had systemic hypertension.

Also, obesity was fairly common among the Creoles, whose diet consisted mainly of goat meat, bread, and pasta. One obese woman had diabetes mellitus.

Only seven cases of malignant disease were seen during the study period (three carcinomas of the penis, two cervical carcinomas, one facial skin carcinoma, and one sarcoma of the arm). All but one of these cases had been previously diagnosed.

Medical examinations, which were also included in the category "other conditions," were periodically requested by Creole families.

The effectiveness of the immunization program was evident, in that no cases of measles, whooping cough, diphtheria, or poliomyelitis were diagnosed during the study period, and only one case of tetanus—in a newborn from Paraguay—was detected. Regarding longevity, many people in the area appeared to reach 60 to 70 years of age or more (though this could not be confirmed, since no birth certificates were issued). Twelve deaths occurred during the study period (five among children and seven among adults); most were related to infections. The number of deaths that occurred in nearby isolated communities during this time is not known.

As Figure 3 suggests, the study showed only minor differences between Indians and Creoles with regard to most health problems. However, nearly all the patients with tuberculosis were Indians, and most cases of brucellosis (for the reason previously mentioned) occurred in Creoles. The few patients with systemic hypertension were Creoles. In addition, obesity was much commoner and musculoskeletal complaints were slightly commoner in Creoles than in Indians.

Discussion

Communicable diseases are still a major health problem in Argentina (3), and much of the high mortality in certain areas is due to diseases preventable by vaccination. Figures are available on the number of reported cases per annum of 12 communicable diseases (4), but regional data on the distribution of disease cases are scarce. The incidence of tetanus in each province has recently been analyzed (5), and a serologic survey of Chagás disease in a portion of the province of Corrientes has been reported (6).

Regarding areas fairly close to the study area, a medical survey of a group of Lengua Indians in the Paraguayan Chaco (7) found that 20% had a productive cough, including 8% with sputum-positive tuberculosis. Intestinal parasites (Ankylostoma, Strongyloides, Trichuris, and Ascaris) were observed in 18% of the villagers. The principal causes of death in young children were measles, diarrhea, tuberculosis, and whooping cough.

Regarding the study area itself, many communities within it still do not have safe drinking water, and most have no means of sewage disposal. Diarrheal diseases and intestinal parasitoses are common. Oral rehydration has been effective in many cases of acute diarrhea, but has only proven feasible in the vicinity of the clinic. Basic sanitation facilities are needed not only in this area but also throughout the Chaco region.

Health care services are not easily accessible to most communities in the Argentine Chaco. Most rural health activities are carried out by multipurpose health agents. There are also a few auxiliary nurses working in village dispensaries and occasional physicians in small clinics. These medical personnel are all paid by the provincial government. Many more health agents are being trained for work in their own communities, in order to achieve greater coverage of the population. One of the main aims of the rural health program responsible for their activities is to control communicable diseases (3). In general, the activities of health agents are being promoted throughout the country at present, and coverage of more inhabitants is gradually being achieved.
ACKNOWLEDGMENTS

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SUMMARY

A study was conducted from 1 June 1979 to 31 May 1980 for the purpose of defining disease patterns among Indian villagers and other inhabitants served by a missionary clinic in a Northern Argentine Chaco village called La Paz. The study, based on the content of consultation forms and clinical notes about each patient, grouped the conditions diagnosed into respiratory diseases; gastrointestinal diseases; obstetrics, gynecology, and genitourinary infections; skin infections; musculoskeletal disorders; and other conditions. Also, for purposes of comparison, Creoles (residents of European descent) and mestizos were considered as one group and Indians were considered as another.

The results indicated that respiratory diseases accounted for the largest single group of conditions diagnosed. Though many of the responsible infections were relatively minor, this category also included a significant number of tuberculosis cases, nearly all of them among Indians.

Gastrointestinal ailments accounted for another large group of diagnoses. Many of these involved chronic diarrhea, which was attributable in many cases to intestinal parasites. In general, however, treatment of diarrhea was mainly requested for young children, especially during acute bouts of the disease.

The third-largest group of diagnoses involved "obstetrics, gynecology, or genitourinary infections." Most of those seen in this category were prenatal patients, with most of the remainder being women seeking family planning services.

Minor skin infections, especially pediculosis capitis and scabies, were common in the study area, but relatively few patients sought treatment for these problems. Musculoskeletal complaints included cases of myalgia, low back pain, arthritis, and a few fractures. Other conditions diagnosed included cases of certain infectious diseases (notably brucellosis, Chagas' disease, rheumatic fever, and hepatitis), a few non-Indian cases of hypertension, two cases of epilepsy, seven cancer cases (six of which had been diagnosed previously), and one case of diabetes mellitus. No cases of malaria, yellow fever, schistosomiasis, or leprosy were diagnosed.

The effectiveness of a local immunization program was evidenced by the fact that no measles, whooping cough, diphtheria, or poliomyelitis cases were diagnosed during the study period, and the only tetanus case diagnosed occurred in a newborn from Paraguay.

Overall, the findings indicated only minor differences between Indians and non-Indians with respect to most health problems. However, nearly all the tuberculosis patients were Indians, while all cases of hypertension—as well as most cases of brucellosis and obesity—occurred among the mestizos and Creoles.

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METHICILLIN-RESISTANT \textit{STAPHYLOCOCCUS AUREUS} IN CANADA

As of 17 February 1984, eight episodes of hospital-acquired methicillin-resistant \textit{Staphylococcus aureus} (MRSA) had been reported to Canada’s Bureau of Infection Control, Laboratory Center for Disease Control, Ottawa. All, with the exception of one episode in British Columbia, had occurred in Ontario and Quebec institutions. The earliest recorded episode occurred in 1978 in Montreal when 10 patients in a surgical intensive care unit were colonized with MRSA.

Data analysis indicates that the most common site of MRSA colonization was a surgical wound. The phage type varied within and between hospitals. An operating room nurse, a surgeon, and a patient were identified as possible sources in three episodes. However, a source could not be determined in the others despite employee screening and/or environmental sampling. The intensive care unit was the focus in one episode and was implicated in another. However, in most instances several wards and floors within an institution were involved.

The transfer of patients from one hospital to another can account for the geographic spread of infection. A patient at one Ontario hospital had non-typable MRSA isolated from his blood and peritoneal fluid in August 1981. In September, he was transferred to another larger hospital in the same province, apparently free of signs and symptoms of infection. While there, the same organism was isolated from a biopsy of a lytic lesion. In this case, it is inconclusive whether the patient was harboring the organism at the time of transfer or whether a new infection was acquired at the second hospital, where isolation of MRSA had begun in August.

In the United States, all reported MRSA outbreaks have occurred in large (over 600 bed) medical school-affiliated hospitals, with smaller institutions encountering sporadic cases of infection through limited intra-hospital spread. A similar situation appears to exist in Canada, where large teaching centers also seem to account for the greatest proportion of cases. In addition, the number of cases of MRSA infection reported to date would indicate that MRSA is emerging as an important nosocomial pathogen in Canada. To facilitate accurate monitoring of this relatively recent development, the Bureau of Infection Control is planning to distribute a questionnaire to the larger hospitals in Canada so as to determine the methods used to identify the organism and gauge its prevalence.