turned up many clients who resided in several low-income subsidized hotels. When TB field staff members visit these hotels, they now have the names of noncompliant people with active TB, results of recent TB tests, and their INH isoniazid therapy status.

Targeting Resources

We purchased MapInfo software (*B*) to assist in targeting outreach to the drug using population. The fire department's first response teams provided us with addresses of people who had emergencies related to illicit drug use. The County Department of Vital Statistics gave us addresses of mothers with drug affected infants. The communicable disease section of the county health department provided us with demographics on injecting drug users with hepatitis, and our health clinic data had addresses by drug abuse codes. This information, combined with our NADR data bank, provided us with a composite picture of areas in the county where we should expend our efforts in the prevention of HIV disease related to injecting drug use. A computerized map divided the county into quarter mile sections. When the predetermined occurrences were entered, the resulting distribution defined areas of need into workable focused boundaries. This mapping approach is also being used to study factors related to tuberculosis control and prevention.

Conclusions

Our experience in developing ways and means to track injecting drug users at risk of HIV led us to the following conclusions:

1. Direct access to a corrections data base and the ability to conduct interviews in the facilities assist in locating injecting drug users.
2. 200 of our NIDA clients were also clients at our tuberculosis clinic. Techniques developed during the NADR project were successfully applied to tuberculosis followup.
3. Although we are unable to say conclusively the improvement in our cumulative followup rate (from 40 percent to 76 percent) was attributable to data base accessing and corrections visits, we can say that more than 19 percent of our followups were performed while clients were incarcerated.

Equipment

A. Paradox Relational Database Software, Borland International, 1800 Green Hills Rd., Scotts Valley, CA 95067-0001.
B. MapInfo Software, 200 Broadway, Troy, NY 12180.

Self-reported Illness Among Travelers to the Russian Far East

MICHAEL BELLER, MD, MPH
MINDY SCHLOSS, RN, MPH

Both authors are with the Section of Epidemiology, Division of Public Health, Alaska Department of Health and Social Services. Dr. Beller is a Medical Epidemiologist and Ms. Schloss is a Nurse Epidemiologist.

Tearsheet requests to Michael Beller, MD, MPH, Section of Epidemiology, P.O. Box 240249, Anchorage, AK 99524; tel (907) 561-4406, fax (907) 562-7802.

Synopsis

This study evaluated the risk of travelers to the Russian Far East developing acute gastrointestinal or respiratory symptoms. Passengers and crew on 10 commercial airline flights from the Russian Far East to the United States were asked to complete a health questionnaire that asked age, sex, country of residence, length of stay, foods and beverages consumed, and about gastrointestinal or "flu" symptoms. Questionnaires were returned by 353 of 662 persons (53.3 percent).

The most frequently reported symptoms were diarrhea (N=18; 5.1 percent) and "flu" symptoms (N=15; 4.2 percent). Among those people who reported symptoms, most were sick for 3 days or less, although 10 (27.0 percent) were still sick at the time that they entered the United States. Age and sex were not associated with symptoms. Persons who drank untreated tap water were more likely to have gastrointestinal symptoms (relative risk = 2.7; 95 percent confidence interval = 1.2, 5.9) while those who drank bottled or canned fruit juice were protected (relative risk = 0.4; 95 percent confidence interval = 0.2, 0.8).

The incidence of "flu" symptoms was similar to the rate for the general population of the United

States while the incidence of gastrointestinal symptoms was increased and only slightly less than the rate among travelers to developing countries. Travelers may wish to restrict consumption of untreated tap water and increase consumption of fruit juices.

Additional work is needed to identify the pathogens responsible for acute illnesses among travelers to the Russian Far East.

The recent historic changes that took place in the former Soviet Union led to the initiation of regularly scheduled commercial air travel between the Russian Far East and the United States in 1991. The relaxation of travel restrictions in the former Soviet Union and the emergence of business opportunities in the region have resulted in increasing numbers of visits by American citizens and other foreigners. We are not aware of any studies examining the potential risks of communicable disease transmission to such travelers.

In June 1991, we investigated two apparently unrelated cases of salmonellosis in U.S. citizens who had recently returned from the Russian Far East city of Khabarovsk. Although no specific source for these infections could be identified, this occurrence raised concern that other persons traveling to Russia might be at risk of contracting infectious diseases.

To evaluate better the health experiences of Americans traveling to the Russian Far East, we conducted a survey of persons arriving by air in Anchorage, AK, from Russia. The survey was designed to assess rapidly the presence of and possible risk factors for acute gastrointestinal and upper respiratory symptoms.

Methods

We made arrangements with a commercial air carrier (Alaska Airlines) for airline personnel to distribute a health questionnaire to all passengers and crew on each flight arriving in Anchorage from Khabarovsk and Magadan in the Russian Far East between June 12 and July 8, 1992. Due to an oversight, questionnaires were not distributed on 2 of the 12 flights during this interval. The anonymous, self-administered questionnaire included questions on the passenger's age, sex, usual place of residence, types of foods and beverages consumed in the Russian Far East, and length of stay. Each person was asked to indicate which, if any, of the following symptoms developed while in the Russian Far East:

- nausea or vomiting (lasting at least 12 hours),
- diarrhea (three or more loose or watery stools in 24 hours),
- abdominal pain or discomfort (lasting at least 24 hours),
- fever or "feverishness" (lasting at least 24 hours),
- "flu" symptoms—fever, headache, sore throat, body ache (lasting at least 24 hours).

For those persons having at least one of these symptoms, the questionnaire asked how long after arriving in the Russian Far East the first symptom developed, whether or not the symptom(s) lasted more than 3 days, and if the person was still sick. All questions (except age) were answered by checking forced-choice boxes to indicate the applicable response. Completed questionnaires were collected at the Anchorage International Airport.

A wallet-size tear-off card was attached to each questionnaire for the traveler to keep. The card requested the person to telephone (collect) the Alaska Division of Public Health if any of the diarrhea, abdominal pain or discomfort, or fever or "feverishness" symptoms previously described developed within 15 days of return to the United States. Statistical evaluation of completed questionnaires was conducted with Epi Info computer software (*1*).

Results

Questionnaires were returned by 353 of 588 passengers and 74 crew members for an overall response rate of 53.3 percent. Respondents were significantly older (mean age = 52 years) than the U.S. general population and were more likely to be male than female (table 1). Of 351 people who indicated their usual place of residence, 344 (98.0 percent) were from the United States and 7 (2.0 percent) were from other countries; none were from the former Soviet Union. Of 352 people who indicated the length of time they spent in the Russian Far East, 305 (86.6 percent) were there for 14 days or less.

Symptoms were reported by 37 (10.5 percent) of the returning persons; diarrhea (N=18) and "flu"

symptoms (N = 15) were most frequently reported (table 2). Eight travelers reported having more than one symptom; six persons had two symptoms, and two persons had four symptoms. Only two people had both gastrointestinal (nausea or vomiting; diarrhea; or abdominal pain or discomfort) and "flu" symptoms.

Although the proportion of travelers who reported having symptoms was greater among those younger than age 50 (23 of 167; 13.8 percent) than among older people (14 of 183; 7.6 percent), this difference was not statistically significant (relative risk [RR] = 1.8; 95 percent confidence interval [CI] = 1.0, 3.4). Likewise, there was no association between sex and symptoms (RR for male versus female = 1.0; 95 percent CI = 0.6, 1.9). Persons who reported that they lived in Alaska had a greater risk of becoming ill than those residing in other States (10 of 53 Alaska residents indicated that they had symptoms versus 27 of 291 persons from other States, RR = 2.0; 95 percent CI = 1.1, 4.0).

Of persons who reported having one or more symptoms, 24 (64.9 percent) indicated that symptoms lasted 3 days or less, 9 (24.3 percent) indicated they lasted more than 3 days, and 4 (10.8 percent) did not specify how long symptoms lasted. Ten of the 37 ill persons (27.0 percent) indicated they were still ill at the time they completed the questionnaire. Twenty persons (54.1 percent) who became ill had onset within 2–6 days after arriving in the Russian Far East. Nine (24.3 percent) became ill earlier and seven (18.9 percent) later than this.

There was no relationship between the length of stay and gastrointestinal symptoms: 7 percent of persons who spent either less than 7 days (11 of 152) or 7 days or more (13 of 200) in the Russian Far East reported gastrointestinal symptoms ($P = .79$) (table 3). The proportion of travelers reporting "flu" symptoms, however, increased as length of stay increased (table 3). When the association between risk of developing symptoms and place of residence (Alaska residents had a twofold higher risk) was adjusted by controlling for length of stay, the point-estimate for the effect was decreased, and the 95 percent confidence interval included 1.0 (Mantel-Haenszel RR = 1.6; 95 percent CI = 0.7, 3.4).

There were associations between several of the types of beverages and food sources we asked about and gastrointestinal symptoms. Persons who reported drinking untreated tap water or who brought their own food to Russia had nearly a threefold higher risk of illness compared with those who did not (table 4). Those drinking bottled or canned fruit juice had an illness rate 2.5 times lower than that of persons who did not (table 4).

There was no association between any of the food sources we asked about and "flu" symptoms (table 4). However, persons who ate food that they purchased from Russian markets or shops (RR = 2.5; 95 percent CI = 0.9, 6.6) or who brought their own food (RR = 2.4; 95 percent CI = 0.9, 6.6) both had elevated relative risk estimates approaching statistical significance. These sources were examined because each may have served as a surrogate measure of the degree of socializing with Russian people.

Gastrointestinal symptoms were reported by 24 people (6.8 percent). Among 305 travelers who spent 14 days or less in the Russian Far East, 19 (6.2 percent) developed gastrointestinal symptoms. To estimate person-days of exposure, we assumed that each person was in the Russian Far East for the number of days equal to the mid-period of the indicated time interval. For example, the 121 peo-

Table 1. Demographic characteristics of 353 travelers arriving by air in Anchorage, AK from the Russian Far East, June-July 1992

Category	Number	Percent
Sex:		
Male	203	58
Female	149	42
Not specified	1	0
Age (years):		
Younger than 30	18	5
30–39	59	17
40–49	90	25
50–59	51	14
60–69	71	20
70 and older	61	17
Not specified	3	1
Place of residence:		
Alaska	53	15
United States (not Alaska)	291	82
Other country (not former Soviet Union)	7	2
Not specified	2	1

Table 2. Symptoms of 37 travelers returning from the Russian Far East who reported having symptoms, June-July 1992

Symptom	Number	Percent
Diarrhea	18	49
"Flu" symptoms[1]	15	41
Nausea or vomiting	8	22
Abdominal pain or discomfort	5	14
Fever or feverishness	3	8

[1] Defined as fever, headache, sore throat, or body ache lasting at least 24 hours.

Table 3. Number of travelers reporting symptoms, by length of stay in the Russian Far East, June-July 1992

Days spent in Russian Far East	Number of travelers	Gastrointestinal symptoms[1]		"Flu" symptoms[2]		Any symptom	
		Number	Percent	Number	Percent	Number	Percent
Less than 1	11	0	0	0	0	0	0
1–2	20	5	25.0	0	0	5	25.0
3–6	121	6	5.0	3	2.5	8	6.6
7–14	153	8	5.2	6	3.9	13	8.5
More than 14	47	5	10.6	6	12.8	11	23.4
Not specified	1	0	0	0	0	0	0
Totals	353	24	6.8	15	4.2	37	10.5

[1] Includes nausea or vomiting, diarrhea, or abdominal pain or discomfort.

[2] Defined as fever, headache, sore throat, or body ache lasting at least 24 hours.

Table 4. Relative risks for gastrointestinal symptoms among 353 travelers associated with selected exposures, Russian Far East, June-July 1992

Exposure	Number exposed	Number ill[1]	Relative risk	95 percent confidence interval
Consumption of:				
Untreated tap water	56	8	2.7	1.2–5.9
Untreated surface water	22	3	2.2	0.7–6.7
Boiled or filtered surface water	27	3	1.7	0.6–5.4
Bottled water	291	20	1.1	0.4–3.0
Boiled or filtered tap water	238	16	1.0	0.4–2.2
Bottled or canned fruit juice	250	11	0.4	0.2–0.8
Coffee or tea	318	19	0.4	0.2–1.1
Sources of food:				
Hotels or restaurants	341	23	0.8	0.1–5.5
Private residences	137	10	1.1	0.5–2.5
Russian markets or shops	93	9	1.7	0.8–3.7
Carried to Russia	136	15	2.7	1.2–5.9

[1] Number of travelers reporting nausea or vomiting, diarrhea, or abdominal pain, or discomfort among those with the specified exposure. Total number with any gastrointestinal symptom = 24.t4

ple who stayed for 3–6 days (table 3) were assumed to have 544.5 person-days of exposure (121 persons multiplied by 4.5 days). Persons in the Russian Far East for 14 or fewer days had a total of 2,186.5 person-days of exposure for an incidence rate for gastrointestinal symptoms of 0.87 per 100 person-days (19 divided by 2186.5 multiplied by 100).

The incidence rate for "flu" symptoms was estimated in a similar way. Among those who spent 14 days or less in the Russian Far East, there were nine people who reported "flu" symptoms for an incidence rate of 0.42 per 100 person-days.

Eight passengers telephoned us to report onset of symptoms after returning to the United States. These people were not included in the 37 travelers who reported symptoms on the health questionnaires. Diarrhea was the most frequent complaint (N = 6) followed by "flu" symptoms (N = 2). Illness occurred from 0 (day of arrival in United States) to 8 days after returning; six of the eight persons reported onset during the first 3 days after return. Age ranged from 38–68 years (mean = 49 years); all were residents of States other than Alaska.

Discussion

This rapid health assessment indicated that 10 percent of short-term American travelers to the Russian Far East developed acute gastrointestinal or respiratory symptoms while in Russia. If persons having onset of gastrointestinal symptoms within 3 days of return to the United States were included, 12 percent of travelers had illness. During the time the survey was conducted, no cases of salmonellosis, shigellosis, giardiasis, or other infectious causes of gastroenteritis among persons who recently returned from Russia were reported to us. To our knowledge, this is the first study examining the incidence of gastrointestinal or respiratory symptoms among travelers to the Russian Far East.

The National Health Interview Survey (NHIS) estimated that the incidence of "indigestion, nausea, and vomiting" resulting in either medical care or activity restriction was 1.6 cases per year per 100 persons among noninstitutionalized adults ages 45 or older in the United States (*2*). Likewise, the Tecumseh study, a community-wide active surveillance program conducted in Michigan, reported that the incidence of enteric illness syndromes (vomiting, diarrhea, nausea, or upset stomach) was 51 per year per 100 persons among adults ages 50 or older (*3*).

Clearly there is a wide difference between these two rates, but if incidence was distributed uniformly over an entire year, the daily incidence rates would be 0.004 per 100 persons for NHIS and 0.14 per 100 persons for the Tecumseh study. These

rates can be compared with the estimated incidence rate of gastrointestinal symptoms for travelers to the Russian Far East, 0.87 per 100 person-days. The observed rate is slightly more than 6 times greater than that reported by the Tecumseh study and more than 200 times greater than NHIS.

Symptoms experienced by travelers seemed to have a relatively short course; nearly two-thirds of ill people reported that they were well within 3 days. Although the incidence of gastrointestinal illness was high when compared with rates in the United States, it is lower than rates reported in a recent review of diarrhea among travelers from industrialized countries to the developing world (*4*). The median incidence rates for diarrhea were 53 percent for travelers to Latin America (24 studies; median length of stay = 21 days) and 54 percent for travelers to either Asia (8 studies; median length of stay = 34 days) or Africa (3 studies; median length of stay = 28 days) (*4*). These rates convert to 1.6–2.5 per 100 person-days, only moderately higher than the rate of gastrointestinal symptoms we observed for travelers to the Russian Far East.

The estimated incidence of "flu" symptoms can also be compared with NHIS and Tecumseh study results. For persons ages 45 or older, NHIS reported incidence rates of 17.9 per 100 person-years for the common cold, 19.7 per 100 person-years for influenza, and 3.2 per 100 person-years for other acute upper respiratory infections (*2*). These rates correspond to 0.05 per 100 person-days for colds, 0.05 per 100 person-days for influenza, and 0.009 per 100 person-days for other upper respiratory conditions. Examination of data reported by the Tecumseh study results in a mean annual incidence for "total respiratory conditions" of 143 per 100 person-years for persons age 50 or older (*5*). This corresponds to a rate of 0.39 per 100 person-days.

Thus, the incidence experienced by travelers, 0.42 per 100 person-days, is higher than the rate reported by NHIS but similar to the rate reported by the Tecumseh study. NHIS included only illnesses resulting in either medical attention or restriction of usual activity, not counting persons with the mildest symptoms. Assuming that there were three to four people with respiratory symptoms for each person seeking medical care or limiting their usual activity as a result of these symptoms, the incidence of "flu" symptoms among travelers to Russia is probably similar to what would be expected in the United States based upon NHIS data.

In summary, Americans traveling to the Russian Far East appear to be at increased risk of developing gastrointestinal symptoms. The magnitude of this risk was slightly less than that reported among travelers to the developing world. The risk was highest among persons who consumed untreated tap water or brought their own food and lower among those who drank bottled or canned fruit juice. Although we could neither distinguish between various pathogens that cause such symptoms nor evaluate the efficacy of possible preventive measures, it may be prudent for future travelers to avoid consumption of untreated tap water and to rely on bottled or canned fruit juice. Because the response rate was relatively low, the results might be different if passengers and crew members who did not return questionnaires differed from those who did. However, our methodology did not permit us to evaluate or follow up nonrespondents. The observed incidence of respiratory symptoms could have been higher if we had asked about "flu" symptoms that occurred after returning to the United States.

Further work is needed to confirm these findings, clarify the potential causes, and evaluate potential preventive measures. Currently, the number of American citizens traveling to the Russian Far East is small. If all seats on every commercial flight were occupied, fewer than 10,000 passengers per year would be transported between the west coast of the United States and the east coast of Russia. As relations between Russia and the United States continue to improve, the number of Americans visiting the Russian Far East is certain to grow, and it will become increasingly important to understand better both the health risks to American travelers and the potential for importation of infectious diseases into the United States.

References

1. Dean, A. G., Dean, J. A., Burton, A. H., and Dicker, R. C.: Epi Info, version 5: a word processing, database, and statistics program for epidemiology on microcomputers. USD, Incorporated, Stone Mountain, GA, 1990.
2. Current estimates from the National Health Interview Survey: United States, 1990. Publication No. (PHS) 92-1509. National Center for Health Statistics, Hyattsville, MD, 1991.
3. Monto, A. S., and Koopman, J. S.: The Tecumseh study, XI. Occurrence of acute enteric illness in the community. Am J Epidemiol 130: 323-333 (1980).
4. Black, R. E.: Epidemiology of travelers' diarrhea and relative importance of various pathogens. Rev Infect Dis 12 (supp.): S73-S79 (1990).
5. Monto, A. S., and Ullman, B. M.: Acute respiratory illness in an American community: the Tecumseh study. JAMA 227: 164-169, Jan. 14, 1974.