Epidemiological Approach to the Prevention of Imported Infectious Diseases in the Age of Globalization

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Abstract

As globalization progresses, over 10% of Japanese citizens now travel abroad. With this, there are many cases in which people catch a variety of infectious and contagious diseases abroad. In addition, new infectious diseases also have been emerging in the world.

Therefore, protection of travelers' health and prevention of the import of infectious diseases are of ever increasing importance.

From this point of view, at the Narita Airport Quarantine Station, a Health Information Corner for travelers going abroad was established in 1992, along with Health Consultation Rooms for arriving passengers.

In order to overcome imported infectious diseases, the promotion of domestic and international cooperation among the health and medical organizations concerned is required for primary prevention, and early detection or treatment of the diseases.

Introduction

As a result of globalization and development in transportation, the number of Japanese who travel to foreign countries has been increasing year by year. Currently, it is over 15 million a year. How do these international travelers maintain their health? It is not uncommon for someone to leave healthy and return sick.

At the New Tokyo International Airport (Narita Airport), the main gateway to Japan, more than 13 million travelers (passengers) from overseas were quarantined in 1994. Of about 1.7 million travelers from Asia, Africa, and South America, where quarantinable communicable diseases (cholera, plague, and yellow fever) were prevalent, more than 50,000 people complained of illness or symptoms (Figure 1 and Table 1)1,2).

Furthermore, in 1994 and 1995, outbreaks of plague, cholera, viral hemorrhagic fever (e.g. Ebola) and other emerging infectious diseases were reported in various countries3-6).

As a result of this increased risk of infection, it has become increasingly important to strengthen the epidemic prevention at ports in Japan, and to develop new measures for primary prevention of infection and health care for travelers going abroad.

The present paper discusses the future preventive strategies for imported infectious diseases, introducing the past results and the new preventive measures at the Narita Airport Quarantine Station.

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Fig. 1 No. of visitors who traveled in cholera-prevalent regions and No. of reported cases with symptoms at the New Tokyo International Airport.

Table 1 Number of reported symptoms (Narita Airport Quarantine Station, 1994)

<table>
<thead>
<tr>
<th>Month</th>
<th>No. of reported cases</th>
<th>Diarrhea</th>
<th>Vomiting</th>
<th>Abdominal pain</th>
<th>Rash</th>
<th>Fever</th>
<th>Headache</th>
<th>Sore throat</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>4,611</td>
<td>2,815</td>
<td>699</td>
<td>1,223</td>
<td>205</td>
<td>880</td>
<td>796</td>
<td>744</td>
</tr>
<tr>
<td>February</td>
<td>3,787</td>
<td>2,357</td>
<td>527</td>
<td>965</td>
<td>189</td>
<td>720</td>
<td>632</td>
<td>551</td>
</tr>
<tr>
<td>March</td>
<td>6,742</td>
<td>4,687</td>
<td>881</td>
<td>1,864</td>
<td>313</td>
<td>1,290</td>
<td>1,167</td>
<td>863</td>
</tr>
<tr>
<td>April</td>
<td>3,545</td>
<td>2,415</td>
<td>402</td>
<td>981</td>
<td>190</td>
<td>615</td>
<td>572</td>
<td>456</td>
</tr>
<tr>
<td>May</td>
<td>3,696</td>
<td>2,550</td>
<td>458</td>
<td>1,029</td>
<td>193</td>
<td>580</td>
<td>531</td>
<td>416</td>
</tr>
<tr>
<td>June</td>
<td>3,246</td>
<td>2,129</td>
<td>380</td>
<td>882</td>
<td>149</td>
<td>541</td>
<td>565</td>
<td>407</td>
</tr>
<tr>
<td>July</td>
<td>4,288</td>
<td>2,879</td>
<td>497</td>
<td>1,223</td>
<td>188</td>
<td>731</td>
<td>723</td>
<td>549</td>
</tr>
<tr>
<td>August</td>
<td>6,417</td>
<td>4,245</td>
<td>891</td>
<td>2,002</td>
<td>302</td>
<td>1,218</td>
<td>1,131</td>
<td>815</td>
</tr>
<tr>
<td>September</td>
<td>5,992</td>
<td>4,013</td>
<td>741</td>
<td>1,855</td>
<td>228</td>
<td>1,190</td>
<td>1,089</td>
<td>813</td>
</tr>
<tr>
<td>October</td>
<td>3,626</td>
<td>2,217</td>
<td>445</td>
<td>963</td>
<td>153</td>
<td>644</td>
<td>612</td>
<td>570</td>
</tr>
<tr>
<td>November</td>
<td>3,464</td>
<td>2,179</td>
<td>463</td>
<td>991</td>
<td>136</td>
<td>600</td>
<td>602</td>
<td>570</td>
</tr>
<tr>
<td>December</td>
<td>3,623</td>
<td>2,265</td>
<td>465</td>
<td>1,023</td>
<td>162</td>
<td>710</td>
<td>687</td>
<td>578</td>
</tr>
<tr>
<td>Total</td>
<td>53,037</td>
<td>34,751</td>
<td>6,849</td>
<td>15,061</td>
<td>2,408</td>
<td>9,719</td>
<td>9,107</td>
<td>7,332</td>
</tr>
</tbody>
</table>

Note: Because one patient may suffer from more than one symptom, the total breakdown of symptoms does not match the number of reported cases.

**Subjects and Methods**

(1) Detection of intestinal microbes from international travelers with diarrhea on arrival

Almost 110 million people were quarantined between 1984 and 1994 at Narita Airport Quarantine Station. Of approximately 170,000 international travelers who suffered from diarrhea and other illnesses, a fecal microbiological examination was performed on 105,607 people who were suspected of having contracted an intestinal infection.

平成9年1月20日
The detection ratios for disease-causing bacteria were conducted on related countries or regions.

(2) Analysis of causative foods in cholera patients

A survey of previous foods and drinks was carried out on a total of 100 Japanese travelers diagnosed with cholera between 1990 and 1994 at the quarantine station. The characteristics of suspected causative foods for cholera were epidemiologically examined with respect to the different regional groups.

(3) Emergence of drug-resistant microbes

In addition to an increase in the number and variety of infectious diseases, the emergence of drug-resistant bacteria is also an important problem.

Sensitivity experiments were conducted at the quarantine station, using various drugs (antibiotics) on strains of Cholera (68 stocks) and Shigella (143 stocks) which were isolated from 211 travelers who visited Asian countries between 1991 and 1993.

(4) Health consultation with travelers before departure

The number of travelers who visited the Health Information Corner of Narita Airport Quarantine Station before departure has been increasing every year. The results of consultations with visitors in 1993 and 1994 were analysed.

Results

(1) Detection of intestinal microbes from international travelers with diarrhea on arrival

As a result of fecal examination, contagious or enteropathogenic bacteria were detected in 12,678 people or 12.0% of the examinees.

About 12% of all cases were contagious bacteria such as Cholera or Shigella. However, the majority were enteropathogenic bacteria such as Vibrio parahaemolyticus or Salmonella (Fig. 2).

In the detection ratio by country or region, there was a high detection ratio of the genus vibrio, including Vibrio cholerae 01 (Cholera), in South-East Asia (Philippines, Thailand, Indonesia, etc.). In

![Fig. 2 Intestinal pathogens isolated from overseas travelers on arrival (Narita Airport Quarantine Station 1984-1994)](attachment)
contrast, Shigella was predominant in South Asia (India, Nepal, etc.) (Fig. 3).

(2) Analysis of causative foods in cholera patients

It was suspected that water or ice had been the cause of cholera infection in about half of the cases among all regional groups, followed by seafoods including sashimi (raw fish), cut-fruit, and salad in South-East Asia, and dairy products and salad in South Asia (Fig. 4)6).

(3) Emergence of drug-resistant microbes

The results of the sensitivity examination showed that streptomycin (SM)-resistant and ST mixture-resistant strains (non-sensitive strains) of Cholera were isolated from travelers who visited Thailand and India, and unlike Cholera, Shigella strains were resistant to a greater variety of drugs.
across a greater region (Table 2).

(4) Health consultation with travelers before departure

Of 11,809 cases from 7,748 travelers who visited the Health Information Corner, the most frequently asked question was on the general information regarding infectious diseases (28.8%). Next was information regarding medical institutions (21.1%), followed by drinking water (18.5%) and foods (14.0%) (Fig. 5).

<table>
<thead>
<tr>
<th>Table 2 Drug sensitivity of 4 strains of Shigella</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strain (stocks)</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>S. dysenteriae (11)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>S. flexneri (45)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>S. boydii (12)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>S. sonnei (75)</td>
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</tbody>
</table>

Fig. 5 Breakdown of health-consulting matters asked from travelers before departure (Narita Airport Quarantine Station 1993-1994)
Discussion

(1) Imported infectious diseases in travelers

The results of fecal examination of international travelers on arrival at the airport indicated that primary prevention and early diagnosis were considered to be more important based on the number of patients, the severity of the cases, or the emergence of drug-resistant microbes.

From the causative foods analysis in cholera patients, it is predicted that sanitary conditions in the related regions and the eating habits of Japanese travelers, e.g. the consumption of uncooked foods, contribute to the onset of the diseases.

(2) Early detection (diagnosis) for early treatment of infectious diseases

In an attempt to deal with a variety of health concerns from arriving travelers, the Health Consultation Rooms were established in the quarantine station to allow quarantine officers (doctors) to provide primary care (e.g., health counseling, first aid, fecal examination and medical information after arrival) to sufferers as required.

As far as imported infectious diseases are concerned, early detection (diagnosis) and treatment are extremely important both for patients themselves and for preventing domestic secondary infections. However, at a time when a large number of travelers visit foreign countries for a short period of time by air, a proportion of the travelers who contract infectious diseases overseas may return to Japan during the latent period of the disease, experiencing the onset after their return. Therefore, it has become necessary to strengthen the cooperation between quarantine stations and domestic health or medical organizations, as well as to promote the quarantine-health consulting system at the ports of entry.

The prevalence of infectious diseases among overseas travelers and the suspected causative foods have been analysed in order to deduce the onset trends in each related region. These real time data are provided to travelers going abroad, in an attempt to prevent infection while overseas.

Another goal of such prevention and early diagnosis programs may be to provide travelers with peace of mind. It is expected further health services, for example, quick genetic diagnoses for malaria could be included in the near future.

(3) Prevention of infection and health care for international travelers

The purpose of health consultation for travelers before departure is to instruct them how to remain healthy abroad and not to bring any disease back home. Therefore, the consultation may be called “preventive quarantine”.

In 1992, the Health Information Corner and a program of educational AIDS prevention videos on over 30 TV monitors were established at Narita Airport by the quarantine.

At the Health Information Corner, travelers going abroad can obtain health-related issues and advices from quarantine officers on the following matters; information on the destination countries or regions, such as prevalence trends or preventive methods of infectious diseases, medical institutions, and the other information for “healthy traveling” (Fig. 6)(7).

From the analysis of health-consulting matters asked from travelers before departure, it appears that travelers are concerned and feel uneasy about getting sick or contracting infectious diseases while overseas.

It is expected that further developement of a system using media outlets, which can rapidly collect and provide worldwide health information will be established.

Conclusion

Globalization may be expected to be accompanied by the increased risk of communicable
diseases.

Therefore, health care for international travelers while overseas is of great importance, along with prevention against the influx of diseases.

With imported infectious diseases, primary prevention and early detection or treatment are essential measures.

Promotion of international cooperation on health or environmental programs in communicable disease–prevalent regions may contribute to the reduction of the imported infectious diseases and also to the production of specialists.

In order to overcome these problems, cooperation will be increasingly needed among the domestic and international organizations concerned.

The problems indicate also that in order to protect our own health, it is important to promote the world health cooperatively.

Acknowledgements

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References

国際化の進展と輸入感染症の予防
前厚生省成田空港検疫所長
大高 道 也

要 旨
国際交流の進展に伴って海外旅行者が急増し、入国時の有症者あるいは輸入感染症例も多なくなっている。また、海外では様々な新興感染症の流行をみており、伝染病の侵入防止と海外旅行者の健康管理は国民の大きなニーズとなっている。
このような状況を踏まえ、成田空港検疫所では、入国時に幅広く応じられる健康相談室と併せ、出国者に対しても健康相談コーナーを設けるなど、“海外で感染症にかからない、持ち込まない”を旨として、渡航先の保健医療情報の提供など感染症予防と健康管理のための啓発と支援を推進している。

輸入感染症に対しては、主として国内での早期発見・治療ならびに海外での一次予防への取り組みが重要であり、検疫所と国内防疫機関などとの連携、海外保健医療情報の収集・提供システムの構築、保健・環境領域における国際協力の推進など、国内外を広く視野にいれた多面的な対策が求められている。