Imported Infections in Children

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Globe-shrinking and globe-trotting have inevitably been accompanied by an increasing movement of people in and out of the UK, and this movement is so rapid that the UK is within reach of every part of the globe inside the incubation period of most infections (Fig. 1). This is reflected in the rising number of infections imported into Britain from all over the world.

Imported infections in the UK can be considered in three groups according to their transmissibility and endemicity under headings derived from a close similarity to the migratory characteristics of birds (Table 1).

1. Infections not transmissible in the UK where there is usually no resident focus of infection (Group A). The most frequent of these infections are malaria and soil-transmitted helminth infections.

2. Infections potentially transmissible in the UK but which have no sizeable resident foci of infection (Group B). Typhoid and certain salmonella and shigella infections are the commonest examples in this group.

3. Infections transmissible in the UK in which there are often large numbers of locally acquired infections present (Group C). Clearly, an infection that is controlled in this country can move from Group C to Group B, as have poliomyelitis and diphtheria. Provided there is a high level of community resistance or diagnostic suspicion with regard to these infections they do not usually constitute a serious hazard.

Many imported infections are potentially lethal: cholera, some shigella dysenteries, Lassa fever, rabies and diphtheria. Some can also cause severe disability: amoebiasis, poliomyelitis and tuberculosis.

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Table 1. Imported infections in children.

| Group | Migrancy (Common or occasional) | Breeding (transmissibility in UK) | Resident status | Examples |
|-------|---------------------------------|-----------------------------------|----------------|----------|
| A     | Common                          | —                                 | —              | —        |
|       | Occasional                      | —                                 | —              | —        |
| B     | Common                          | +                                 | —              | —        |
|       | Occasional                      | +                                 | —              | —        |
| C     | Common                          | +                                 | +              | —        |

In the non-transmissible infections within Group A it is mainly a question of a balance of power between the infectious agent and the host, with the environment merely one factor in the balance (Fig. 2). Recognition and treatment are the important issues in the control of this group. However, in the transmissible infections of Groups B and C the environment assumes a much greater importance and forms one point of interaction in a triangle of the infectious agent, the host and the environment. Control here concerns not only recognition and treatment but also containment.

**Awareness of Imported Infections**

Despite the increasing frequency of infection derived from overseas, there is still some lack of awareness of the problem. A questionnaire sent to a selected group of paediatricians in the UK and Irish Republic seeking information on the number and types of infections detected in their patients revealed that about half of those who responded had either not seen or not recognised any imported infection in their practice. The majority of the remainder found that the task of recalling the details of those they had seen was difficult, time-consuming, and questionably correct. Still fewer attending a seminar on infectious diseases in children held at the College[1] were aware of the regular reports on communicable diseases issued from centres in England, Wales and Scotland.

Many tropical infections are not notifiable and information on them is not readily available. More accurate and complete data on infections, which tend to need specialised laboratory confirmation for their recognition and identification, are provided by the public health and hospital laboratories or special reference laboratories, such as those for malaria or amoebic infection. The danger here is in over-reporting individual clinical infections as carriers; relapsed and multiple infections may not be distinguished. In addition, there is the problem of encouraging medical and laboratory personnel to notify the cases.

In order to supplement this information a request was made to selected paediatricians to notify any infection in

**Fig. 2. Transmission of infection between the infectious agent, host and environment.**

1. Group A

   Infectious Agent

   Environment (Family, community)

   Host (Individual child)

2. Groups B and C

   Infectious Agent

   Environment (Family, community)

   Host (Individual child)
Fig. 3. Imported infections in children under 13 years of age according to the type of infection and country of origin. (The numbers represent percentages of the total—180.)

Fig. 4. Imported infections in paediatric practices in the UK and Irish Republic.

Key: The first number refers to the number of children recognised as having an imported infection and the second the number of paediatric practices from which these were reported.

Fig. 5. Malaria notifications to Malaria Reference Laboratory (1976).
Table 2. The incidence of various imported infections in children from various sources, 1976-1978.

|                  | Reports from laboratories* | Malaria reference laboratory | Paediatricians in the UK and Irish Republic |
|------------------|-----------------------------|----------------------------|--------------------------------------------|
|                  | 1976 | 1977 | 1978 | 1976 | 1977 | 1978 |                  |
| Malaria          | 121  | 116  | 129  | 225  | 217  | 224  | 69              |
| Vivax            | 100  | 93   | 105  | 182  | 180  | 169  | 29              |
| Falciparum       | 15   | 17   | 19   | 29   | 30   | 48   | 9               |
| Malariae         | 6    | 3    | 1    | 10   | 4    | -    | 5               |
| Ovale or unspecified | 3   | 3    | 4    | 4    | 3    | 7    | 26              |
| Typhoid          | 73   | 72   | 77   | -    | -    | -    | 11              |
| Paratyphoid A    | 6    | 8    | 11   | -    | -    | -    | 2               |
| Paratyphoid B    | 1    | 9    | 15   | -    | -    | -    | 2               |
| Entamoeba histolytica | 43  | 28   | 18   | -    | -    | -    | 1               |

*to the Communicable Disease Surveillance Centre (PHLS) and the Communicable Diseases (Scotland) Unit.
(a) 7 multiple infections. (b) 5 multiple infections. (c) 3 multiple infections. (d) 2 multiple infections.

children under 13 years of age recognised as likely to have been imported from the beginning of 1976 to mid-1977. Between 90 and 100 paediatricians were circularised and of 82 replies 38 (46 per cent) had recognised no clearly imported infections in their practices. The remainder (44) reported 180 infections, two of which had occurred as multiple infections in the same child. The dominance of malaria, with India providing most of the imported infections, is shown in Fig. 3.

The distribution of the paediatricians who responded and the number of cases of imported infections reported in each area are shown in Fig. 4. The likelihood of such an infection being seen is greatest in the Midlands and South-East of England, as would be expected, but kala-azar was diagnosed in Aberdeen, malaria in Yeovil and yaws in South Wales. The disparity between the reports of imported infections in children is seen in Table 2, but it is of interest that the distribution of malaria in children as known to the Malaria Reference Laboratory (Fig. 5) is similar to the pattern of imported infections as derived

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Fig. 6. Notification of tuberculosis (Registrar General).

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from paediatric practices, and it is suggested that malarial notification might be used as an index of risk as far as imported infection in general is concerned.

**Influence of Population Movement**

It is important to know the current travel movements of people, where the immigrant children and their families are coming from and going to. The waves of tuberculosis notifications from Midland cities compared with the falling number of patients in the general population of England and Wales are shown in Fig. 6[2]. In some cities these waves often appear to coincide with the mass arrival of the male breadwinners of the family, followed a year or two later by the families[3]. The pattern of malaria reported to the Malaria Reference Laboratory in the four quarters of 1976 showed a large rise of vivax malaria, particularly between the second and third quarters, which had no parallel with falciparum malaria. Reports of both types of malaria in the first quarter were low (Fig. 7), and it is not known whether this is the effect of the winter pre-monsoon holiday season for Asian families returning from home, combined with the usual three-month incubation period. The tourist resorts frequented by the British are also changing. More now go abroad for their holidays and this has led to a change in the type of illness, for example, typhoid in recently returned holidaymakers from some Mediterranean countries or giardiasis in some who have visited Leningrad[4, 5].

Knowledge of the current epidemics of potentially pandemic infections occurring abroad, such as influenza and cholera, is very necessary and needs no justification. It is equally important to know the current geography of malaria, yellow fever and a great many other so-called tropical infections. Figure 8 shows clearly that malarial infections from the Indian subcontinent are nearly all vivax, whereas those from Africa are falciparum, with the few malarialae from both. Table 3 demonstrates the

**Table 3. Annual incidence of reported malaria in the UK and Irish Republic compared to other selected imported infections, 1972-1978.**

|                  | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 |
|------------------|------|------|------|------|------|------|------|
| Malaria          | 354  | 558  | 699  | 787  | 1,259| 1,554| 1,955|
| Typhoid          | 198  | 226  | 213  | 297  | 273  | 299  | 291  |
| *Shigella boydii* infection | 36   | 50   | 56   | 71   | 52   | 60   | 53   |
| *Shigella dysenteriae* infection | 44   | 32   | 27   | 37   | 30   | 38   | 34   |
rapidly rising increase in the number of cases of malaria in this country which can best be explained by the growing problem of malaria in the Indian subcontinent, reflected in the increasing number of people arriving with the infection. A recent analysis of cases of malaria diagnosed in the Wolverhampton area in 1978 revealed a 42 per cent increase (112 cases in 1977 compared to 158 cases in 1978) thus reflecting the present upsurge of this infection[6].

Discussion

An attempt has been made to indicate some of the information needed to underline areas of risk and trends needing reversal. Certain risks can be predicted, particularly in infections of Group B (i.e. where there is no sizeable resident focus), in areas where there is a high risk of transmission and a low level of immunity and where the incidence of imported infection is already high. The decreasing herd immunity to infections such as poliomyelitis and diphtheria, due to erosion of the immunisation programme, is a particular risk in this respect.

Some infections such as malaria among immigrants and returning travellers, particularly from the Indian subcontinent, are relatively frequent and are being notified increasingly often[7]. Lack of recognition of imported infection by paediatricians may mean that some infections are being missed, particularly the sub-lethal types with relapsing or bizarre symptoms. In this respect the apparent low incidence of amoebic infection in children may be of concern[8].

Different patterns of symptoms, virulence and resistance to therapy in imported strains of infection are being reported, particularly among the shigella and salmonella groups, and need to be recognised. The global geography of epidemics of infection should be more widely known by paediatricians and other medical practitioners in those professional authorities concerned with immigrant health.

The disparity and incompleteness of notifications and the data they generate should be a cause of concern and study. A more coherent and readily available information system will help to anticipate hazards and reduce the risks and trends discernable even from the present fragmentary data. In addition, because the traveller usually relies for most of his advice on his travel agent, it is surely important that the agent is aware of and distributes information on the health hazards associated with the journey being organised. There should be greater liaison between travel organisations and the national and international agencies, and the Ministry of Overseas Development could also play an important advisory rôle.

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