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## Review Paper

# Comparison of the Hungarian and Scottish communicable disease control systems: Lessons for a convergent European Community

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## SUMMARY

**Background:** European public health systems are converging, particularly in relation to communicable disease control. This process requires mutual learning through comparison; this was undertaken for Scotland (population 5.1 million) and Hungary (population 10.5 million).

**Methods:** Using the official web- and paper-based publications, the practice of communicable disease control was compared between the two countries in three specific fields: seasonal influenza surveillance; human immunodeficiency virus (HIV) surveillance; and the childhood vaccination system.

**Results:** The organization structure for communicable disease control was very similar, comprising of government, national, regional and sub-regional tiers in Hungary, and government, national and local (sub-regional) tiers in Scotland. The influenza surveillance system in both countries was mainly based on the 'fluspotter system'. In the 2005/6, 2006/7 and 2007/8 seasons, there was no exceptional influenza activity in either country. Although the data collection and surveillance system of HIV is similar, there was a massive difference in the number of reported cases. In 2007, the cumulative incidence of reported HIV cases was 14.74/100,000 in Hungary and 105.21/100,000 in Scotland. The routine childhood vaccination schedule is similar in the two countries. However, while the vaccine uptake rates were nearly 100% in Hungary, these rates were lower in Scotland. The numbers of reported pertussis (98 vs 48), mumps (2741 vs 16), rubella (146 vs 0) and measles (168 vs zero) cases were significantly higher in Scotland than in Hungary. There were no differences for polio and chickenpox.

**Conclusions:** The economic difference between the two countries not reflected in the efficiency of communicable disease control and in communicable disease patterns. The historical, political and cultural differences seem more determinative in this comparison.

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## Introduction

The European Community (EC) shares public health goals that are especially focused on communicable diseases.<sup>1,2</sup> The

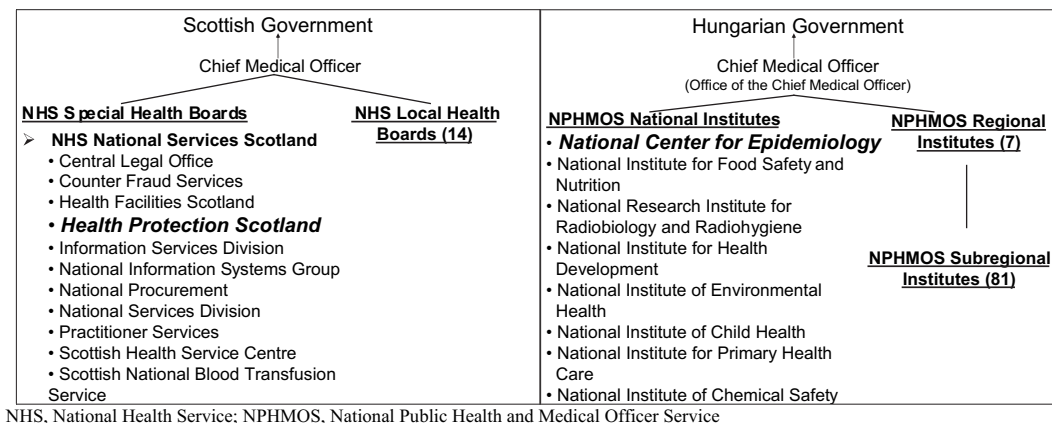
enlargement yet increasing convergence of the EC offers opportunities for cross-national learning through comparison of systems and outcomes. This paper reports such an exercise for two of the smaller EC states: Hungary and Scotland. These

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**Figure 1 – Structure of the National Public Health Services in Scotland and Hungary.**

states were chosen because the first author (DS) came from Hungary to Scotland to learn about the Scottish system. In an era when the volume of international migration is steeply increasing around Europe and the importance of the International Health Regulations 2005 is growing, the exercise offers some lessons that warrant further reflection, including whether there would be benefits from a pan-EC exercise of this kind.

Scotland, as part of the UK, joined the EC in 1973, and Hungary joined in 2004. Although within the same political-economical community, there are still remarkable differences between their economies. In 2005, the gross domestic product, the marker of a state's economic strength, was \$16,970 per capita in Hungary and \$33,460 in Scotland.

Nearly twice as many people live in Hungary as in Scotland (10.45 million and 5.14 million, respectively, in 2007). The dominant ethnic group in both countries is White European. The largest ethnic minority group in Hungary is the Gypsy or Roma community (1.9% of the population), while in Scotland, it is the South Asian population (1.09% of the population). Life expectancy at birth is lower in Hungary than Scotland for both genders, but the difference in males is remarkable (–5.8 years in 2006).<sup>3,4</sup> Diseases of the circulatory system and cancer are the leading causes of death in both countries. Infectious and parasitic diseases are responsible for a modest proportion of all deaths in each country.<sup>5,6</sup>

This study examined the communicable disease control systems in an economically stronger old European Union state, Scotland, and a recently joined country with a weaker economy, Hungary. The aim of this study was to derive lessons for a unifying Europe.

## Methods

Official web- and paper-based publications were used to compare the two countries' communicable disease control systems and communicable disease patterns. Data and reports published by the National Public Health and Medical Officer Service (NPHMOS), the National Centre for Epidemiology (NCE) and the Hungarian Central Statistical Office were used to collect information from Hungary.<sup>7–14</sup> Beyond these, country reports from Hungary published by international organizations [World

Health Organization (WHO), Joint United Nations Programme of HIV/AIDS (UNAIDS)] were used.<sup>15–17</sup> Data and reports by the National Health Service National Services Scotland (NHSNSS), Health Protection Scotland (HPS) and the Information Services Division were used to collect information from Scotland.<sup>18–26</sup>

In addition to the structure of the surveillance systems and their most important control measures, the numbers of reported influenza, human immunodeficiency virus (HIV) and vaccine-preventable communicable childhood diseases were examined.

## Results

### Communicable disease control services

In both countries, the prevention and control of communicable diseases is a task for national public health services. Fig. 1 summarizes the structure. In Hungary, the NPHMOS is responsible for public health, epidemiology, health promotion, health service administration and the health service. It is headed by the Chief Medical Officer, who completes his/her task under the Minister of Health. The service is delivered through national institutes, and NPHMOS offices at national, regional and sub-regional levels. The national institutes are the methodological centres of their particular medical specializations, and the National Centre for Epidemiology is responsible for the prevention and control of communicable diseases. On a territorial basis, NPHMOS is organized at three levels: the Office of the Chief Medical Officer, seven regional offices and 81 sub-regional institutes.<sup>7,8,15</sup>

In Scotland, the National Health Service (NHS) is organized by the Scottish Government (including the Chief Medical Officer) and is delivered through special health boards and geographically-based local health boards. One of the eight special health boards is NHSNSS. The division of the NHS that is responsible for the prevention and control of communicable diseases is HPS. The 14 local health boards represent the local level of public health services and they cover the country on a territorial basis.<sup>18,19</sup>

The information flow from bedside to the national surveillance centre is very similar in the two countries. In

Hungary, paper-based communicable disease notifications from doctors and laboratories are sent to the responsible sub-regional office of NPHMOS, where the data are digitalized and forwarded to the regional office and then the national centre electronically using the Epidemiológiai Felügyeleti Rendszer és azt támogató Informatikai Rendszer (Epidemiological Surveillance System and supporting Information Technology System) software. The collected and analysed data are published weekly by the NCE in the *Epinfo* journal and also annually in the Epidemiological Situation of Hungary report. In Scotland, in addition to the paper-based notifications between laboratories and the health boards, an electronic data reporting system has been developed (Electronic Communication of Surveillance in Scotland). Data on notifiable diseases are transferred from the health boards to the national centre electronically using the Scottish Infectious Disease Surveillance System (SIDSS2). Similarly to the NCE, HPS publishes the collected and analysed data weekly in the HPS weekly report and also annually.

The way in which the communicable disease control services operate is illustrated in detail using the three examples below.

### Seasonal influenza

#### Surveillance

The principles of the influenza surveillance system are similar as both countries are members of the EuroFlu (formerly the European Influenza Surveillance Scheme), which endeavours to harmonize surveillance systems. The surveillance of influenza in both countries is based on reports by sentinel general practitioners (GPs) to the 'fluspotter system'. During the influenza season (from week 40 in a given year to week 20 of the following year), clinical and virological data are collected from sentinel GPs who take nose and/or throat swabs from patients with influenza-like illnesses. These specimens are sent to the national reference laboratory where they are tested for influenza viruses. The results are used to validate the clinical reports.<sup>27</sup>

In the 2007/8 season, approximately 1300 out of 6523 Hungarian GP and family paediatrician practices participated in the 'fluspotter system', covering 20% of the country's population. In Scotland, approximately 70 of 1031 GP practices participated in the scheme, covering 8% of the population. In Scotland, two other sources are used for data collection as well as the 'fluspotter system'. The Scottish Enhanced Respiratory Virus Surveillance is also based on designated GPs, covering another 3% of the population in the 2007/08 season. The third Scottish data source is the NHS24 telephone advice service. The volume of telephone calls from the public with specific symptoms is used to monitor respiratory virus activity.<sup>9,10,20,21</sup>

For specific population risk groups, active influenza vaccination is recommended in both countries. The prime target populations are the elderly (>60 years in Hungary and >65 years in Scotland), patients with certain chronic diseases, residents of long-stay care facilities, healthcare workers, carers and poultry workers. In 2006, the vaccination coverage rate in the targeted elderly age group was 77.8% in Scotland and 34.1% in Hungary. This exceeds the WHO's 75% target level in Scotland but lags behind in Hungary.<sup>11,22</sup>

**Table 1 – (a) Highest seasonal influenza-like illness activity in recent years (per 100,000 population/week). (b) Threshold levels of flu activity (per 100,000 population/week)**

	Seasons			
	2005/6	2006/7	2007/8	
(a)				
Scotland	33	158	50	
Hungary	200	500	540	
	Flu activity level			
	Baseline	Normal	Higher than expected	Exceptional
(b)				
Scotland	0-50	50-600	600-1000	>1000
Hungary	0-200	200-500	500-1000	>1000

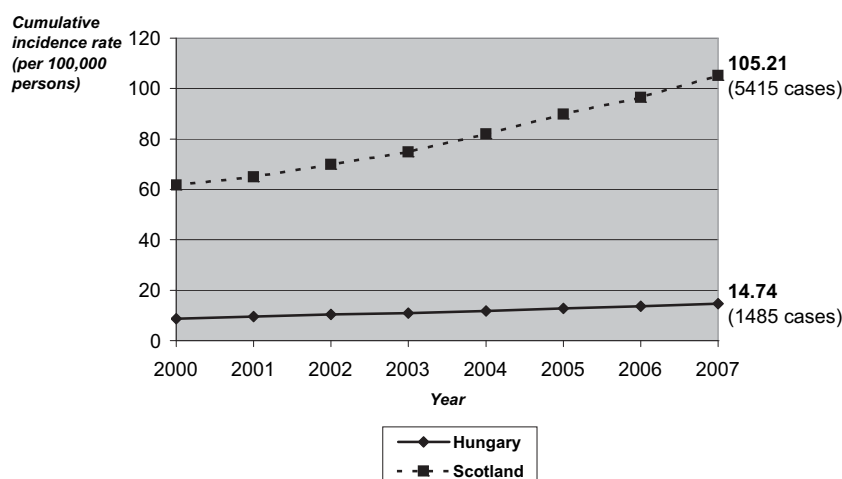
#### Disease frequency

Seasonal influenza activity is based on the number of reported influenza-like-illness cases per 100,000 persons per week. Table 1 shows that in the 2005/6 and 2006/7 seasons, activity remained in the baseline and normal range in both countries, although it was lower in Scotland. In the 2007/8 season, activity in Hungary reached 540 illnesses/100,000 on the fourth week of 2008, so activity was higher than expected. In Scotland, activity remained in the baseline range in the 2007/8 season. Exceptionally high seasonal influenza activity was not found in either country in 2005/6, 2006/7 or 2007/8.<sup>9,20</sup>

### HIV

#### Surveillance

In both countries, the main source of information on newly diagnosed HIV/acquired immunodeficiency syndrome infections is case reporting by laboratories and clinicians. Both are required to report positive results. Other sources are voluntary screening programmes which aim to diagnose HIV-infected persons prior to the appearance of symptoms. Blood donors, organ transplant recipients and donors, and dialysed patients are routinely screened in both countries. Healthcare workers, nursing mothers and anyone who has close contact with blood, semen or vaginal fluids are also routinely and compulsorily screened in Hungary but not in Scotland. According to the Hungarian National AIDS Strategy 2004–2010 and the UK National Guidelines for HIV Testing 2008, the voluntary screening programmes are more or less similar in the two countries; HIV testing is routinely offered and recommended to all patients suspected of having sexually transmitted diseases and HIV high risk groups (e.g. intravenous drug users, homo-/bisexual persons, sexual partners of HIV-infected patients, etc.). The few differences include: prisoners are screened in Hungary but not in Scotland; and pregnant women are routinely screened in Scotland (antenatal screening programme), while they are not screened routinely in Hungary but are included in the sentinel surveillance examination programmes. In Hungary, HIV tests can be performed anonymously; this is not an option in Scotland. In recent years, the number of screening tests performed has



**Figure 2 – Cumulative incidence of reported cases of human immunodeficiency virus between 2000 and 2007 in Scotland and Hungary.**

been stable in Hungary and increased steeply in Scotland, where it nearly doubled between 2003 and 2006. In 2006, in addition to blood donor samples, 80,168 screening tests were performed in Hungary (0.76% of the population) and 30,386 in Scotland (0.59% of the population).<sup>16,28,29</sup>

#### Disease frequency

Newly reported HIV infection is increasing in both countries, but the cumulative number and prevalence of reported HIV infections is significantly higher and rising faster in Scotland than in Hungary (Fig. 2).<sup>12,23</sup> The actual number of people with HIV is probably higher in both countries. The estimate relating to Hungary made by the WHO/UNAIDS is between 2000 and 5900 cases.<sup>17</sup> The prevalence in Hungary with these data (19.1–56.5/100,000) is less than the prevalence of the (also underestimated) reported numbers in Scotland (105.21/100,000).

In both countries, most cases are male (76% in Hungary, 72% in Scotland) and live in the central area of the country: Budapest in Hungary (61%) and the Glasgow–Edinburgh central belt in Scotland (65%). The main route of transmission in Hungary is homo-/bisexual intercourse, which is responsible for 50.4% of all infections. Although heterosexual transmission is increasing, it is still uncommon in Hungary (17.6%), and the disease is rare in the intravenous drug user community (1.3%). In Scotland, as well as the homo-/bisexual group, heterosexual transmission is also high (36.2% and 32.3%), and in contrast to Hungary, the spread of HIV amongst intravenous drug users is a huge problem (24.5%). A significant proportion of HIV-positive persons in both countries are foreign citizens or local citizens who acquired the infection abroad (36% in Scotland, 27% in Hungary). The majority of them are from sub-Saharan Africa.<sup>12,16,23</sup>

#### Vaccine-preventable communicable childhood diseases

##### Immunization

Table 2 shows that the routine childhood vaccination schedule is similar in both countries. In Hungary, vaccination is mandatory and parents who refuse vaccination face legal

consequences. The vaccine completion rates relating to all vaccines were nearly 100% in Hungary. In Scotland, the system is voluntary so the uptake rates are lower.<sup>13,24,25</sup>

Vaccine-preventable communicable childhood diseases (poliomyelitis, diphtheria pertussis, mumps, measles, rubella) belong to the statutory notifiable diseases in both countries, so the data collection process about their occurrence is very similar. Although case definitions for communicable diseases are determined by regulation of the European Union,<sup>30</sup> notifications are mainly based on the medical practitioner's clinical suspicion of infection; laboratory confirmation is only performed for a minority of all cases.

#### Disease frequency

Fig. 3 summarizes results for some childhood infections in 2007. The number of reported pertussis cases was 48 in Hungary and 98 in Scotland, which means a difference in incidence rates of almost four-fold (0.5 vs 1.9 per 100,000). There were no notifications of rubella and measles, and only 16 cases of mumps in Hungary, whereas the Scottish numbers were 146 cases of rubella (incidence rate per 100,000: 2.8), 168 cases of measles (incidence rate: 3.3) and 2741 cases of mumps (incidence rate: 53.3). For varicella (where a vaccine exists but is not included in the routine vaccination schedule), there was little difference between the two countries.<sup>14,26</sup>

## Discussion

In both countries, the communicable disease control system is within the public health service and headed by a national office: the NCE in Hungary and HPS in Scotland. The influenza surveillance systems are very similar in the two countries as a result of their EuroFlu membership. There were no extraordinary outbreaks in recent years, and the higher influenza-like illness activity in Hungary can be explained by more than one reason. The higher vaccination coverage rate in the elderly population in Scotland results in lower influenza activity in this age group in this country. However, reported



**Table 2 – Routine childhood vaccination schedules in 2007 and coverage**

Age	Hungary		Scotland	
	Vaccine	Coverage <sup>a</sup>	Vaccine	Coverage <sup>b</sup>
0–6 weeks	BCG	100%		
2 months	DTPa + IPV + Hib	100%	DTPa + IPV + Hib	96.7–97.8%
			PCV	84.9%
3 months	DTPa + IPV + Hib	99.9%	DTPa + IPV + Hib	96.7–97.8%
			MenC	97.1%
4 months	DTPa + IPV + Hib	99.9%	DTPa + IPV + Hib	96.7–97.8%
			MenC	97.1%
			PCV	91.6%
12 months			Hib + MenC	
15 months	MMR	99.9%	MMR	93.8%
			PCV	84.3%
18 months	DTPa + IPV + Hib	99.8%		
3 years	DTPa + IPV	99.9%	DTPa + IPV	94.1–94.2%
			MMR	88.9%
6 years	DTPa + IPV	99.9%		
11 years	dT	99.5%		
	MMR	99.5%		
14 years	Hepatitis B	99.6%	dT + IPV	

BCG, Bacillus Calmette-Guerin vaccine; DTPa, diphtheria/tetanus/acellular pertussis vaccine; IPV, inactivated polio vaccine; dT, diphtheria/tetanus vaccine; Hib, *Haemophilus influenzae* type b vaccine; MMR, measles/mumps/rubella vaccine; MenC, meningococcal C conjugate vaccine; PCV, pneumococcal conjugate vaccine.

a Vaccine completion rate in the selected cohorts in 2007.

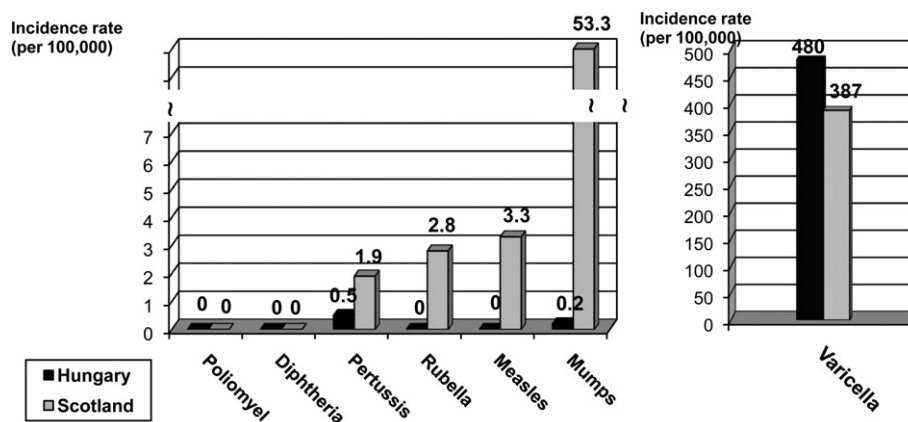
b Primary and booster immunization uptake rates by 6-year-old cohort in 2007.

influenza activity can also be influenced by differences in the data collection process; the fluspotter system's coverage is higher in Hungary, and the likelihood of people seeking health care is also higher in this country (in 2006, the annual number of face-to-face GP consultations per 100 inhabitants was 611.6 in Hungary and 432.9 in Scotland).<sup>10,21</sup>

The reported number of HIV-infected cases was significantly higher in Scotland than in Hungary. In Hungary, homo-/bisexual transmission is still the dominant means of spread, while homo-/bisexual transmission, heterosexual transmission and spread amongst intravenous drug users are all common in Scotland.

In general, Central European countries have a lower HIV incidence and prevalence rate than Western Europe.<sup>31</sup> The

main determinants of this variation are probably the social, cultural and political differences which influence the region's migration pattern and the people's lifestyle. Before 1989, international travel in Hungary was heavily restricted by the communist regime. In the last 20 years, international migration is increasing but has still not reached the Western European level. Therefore, the number of travellers and immigrants from high-risk countries is much lower in Hungary than in Scotland. The sizes of high-risk groups (intravenous drug users, homosexual men) also influence the occurrence of this disease. The relatively low prevalence of intravenous drug use in Hungary, as estimated by the European Monitoring Centre for Drugs and Drug Addiction in 2005, was 0.6 per 1000 inhabitants vs 4 per 1000 inhabitants in the



**Figure 3 – Incidence rates of vaccine-preventable communicable childhood disease notifications in 2007 in Scotland and Hungary.**

UK. This may also contribute to the favourable results for Hungary.<sup>32,33</sup>

Vaccination coverage against pertussis, mumps, measles and rubella in Hungary is nearly 100% because it is mandatory. The Scottish vaccination system is voluntary and coverage is lower. As a result, the incidence rates of these diseases are much lower in Hungary than Scotland. The mandatory vaccination system was introduced during the 1950s and 1960s in Hungary by the communist political government. There was no resistance from the population. Although the regime changed in 1989, the vaccination system remained mandatory. In the 20th Century, there were attempts in the UK to introduce a mandatory system (e.g. in 1948), but there was strong opposition by the population so the system stayed voluntary.

The economic difference between the two countries is not reflected in the effectiveness of disease control and the disease patterns in respect of influenza, HIV and vaccine-preventable communicable childhood diseases. The historical, political and cultural differences seem more determinative.

Although the aim of this study was to assess the effectiveness of communicable disease surveillance and control systems in the two countries, it is a limitation of this work that the incidence rates of the selected communicable diseases are not direct indicators. For the vaccine-preventable communicable diseases, the low number of cases in Hungary is probably the result of the mandatory vaccination system, but for HIV and influenza, other factors (sociocultural differences, differences in the data collection system) are more determinative.

The following, somewhat surprising, conclusions were drawn:

- despite its economic superiority, long-established public health services, a well-resourced free health service, international track record in medical research and similarities in governance structures and processes, Scotland had poorer population health outcomes for both AIDS and immunizable childhood diseases than Hungary. It fared better for influenza;
- for AIDS and HIV, the explanations are likely to be differing specific cultures and resulting behaviours (sharing needles) and migration patterns (e.g. from high-risk areas such as sub-Saharan Africa);
- for childhood diseases, the difference is simply that immunization is mandatory in Hungary and voluntary in Scotland;
- the differences in influenza rates may relate to greater immunization of high-risk groups in Scotland, and also to differences in the data collection process; and
- comparisons of this type, although basic and descriptive public health, have value in pointing to potential improvements.

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## Competing interests

None declared.

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