THE COMPARATIVE SAFETY OF THE BLOOD SUPPLY IN THE REGIONS OF GREECE

Clive S. Richardson
Constantina Politis

1. Introduction

The purpose of this paper is to examine whether citizens of the different regions of Greece who need to receive a blood transfusion during the course of medical treatment, have access to equally safe supplies of blood. We start by giving some background information.

Blood transfusion is an important weapon of modern medicine but it is very much a two-edged sword: if the transfused blood contains viruses, bacteria or parasites, then the intended beneficiary can tragically become the victim of serious, even fatal, disease. Of course, blood is never transfused unless it has been screened for the presence of known infections. But no screening test is perfect and there remains a residual risk of the transmission of an infection that the test was unable to detect. Furthermore, new infections appear from time to time, the most notable in recent years being the virus known as HIV which leads to AIDS. Many cases of AIDS occurred as a result of blood transfusion before the identification of the virus and the introduction of effective screening tests.

Since tests cannot provide complete protection, it is important to start with blood that is as safe as possible, that is, is unlikely to contain a transmissible infection. (There is an economic motive here too. Certain tests are confirmatory tests that are only applied if an initial, simpler test is positive. Thus the safer the initial blood supply, the fewer the confirmatory tests that will be needed, resulting in a very large monetary saving.) For this reason, people offering to donate blood are asked to complete a short questionnaire, after which they may be excluded from donation if, for example, they have resided in certain areas of the world or if their behaviour lays them open to increased risk of sexually transmitted diseases (which include several of the serious blood-transmissible infections). But, beyond this, it is widely acknowledged as the cornerstone of the work of the blood services that *the safest blood is obtained from voluntary non-remunerated donors* (European Commission, 2000). In other words, people who are giving their blood

entirely altruistically, with no form of direct (e.g. cash) or indirect (e.g. time off work) compensation are the least likely to be carrying infections. Thus, an indirect but important measure of the safety of blood is how much of it is provided by true volunteers. Various countries manage to cover their entire demand from this source. This is unfortunately not the case in Greece, where the proportion of blood supplied by volunteers has risen from about 30% at the start of the 1990s, but has stuck at about 40% for the last 5-6 years. Most of the rest is supplied by the family and friends of patients in need of transfusion, who are not regarded as being as safe a source as true volunteers. (A small proportion – below 5% - is obtained from recruits to the armed forces and an even smaller amount is imported. Paid blood donation – the least safe source – stopped many years ago.)

Blood in Greece is collected and distributed exclusively by a network of nearly 100 services, all based in public hospitals. There are three categories of blood services: blood centres, blood stations A, and blood stations B. The 14 centres have the greatest facilities and widest responsibilities, including the supervision of the blood stations and the provision of specialized services that the stations lack. The number of blood services is large for a country the size of Greece and it is open to doubt whether the smaller services operate optimally. In 2001, the average number of blood units collected was 16650 by blood centres, 7660 by blood stations A, and only 2970 by blood stations B. On average, blood centres collected annually 2,345 blood units per doctor, 1,692 per nurse and 2,398 per technician, compared to only 1,473 per doctor, 483 per nurse and 1,313 per technician in blood stations A (Hellenic Haemovigilance Coordinating Centre, 2003).

2. Proportion of blood provided by volunteers

Table 1 presents the total blood collection and the percentage collected from volunteers, in each of Greece's 13 regions in 2001 (the latest complete year available) and 1996 (for comparative purposes). There is a very wide variation in the percentage collected from volunteers, from 26.3% in the South Aegean Islands to 52.5% in Western Greece, in 2001. The lowest percentages occur in the islands (including Crete), Western Macedonia and Eastern Macedonia-Thrace. The range of variation was even wider in 1996, but the exceptionally low figures in Western Macedonia and the South Aegean Islands have since improved somewhat.

The percentage of voluntary donation has some correlation with the absolute number of units of blood collected in the region. The values of Spearman's correlation coefficient are 0.49 in 2001 and 0.50 in 1996. In other words, the regions with the heaviest demand for blood cover a larger share of it by collecting from volunteers. In interpreting this finding, we should bear in mind the structure of the blood services. Of the 14 large and fully equipped centres, six are in Greater

Athens, two each in Thessaloniki and Patras, and one each in Ioannina (Epirus), Irakleio (Crete), Alexandroupolis (Eastern Macedonia and Thrace) and Larisa (Thessaly). Thus there are six regions without a blood centre. Although there are no doubt many efficient blood stations, an obvious interpretation is that the regions with low blood collection lack large services and the smaller services are less able to recruit volunteer donors. Figure 1 shows the percentage of volunteers by region in relation to the average size of the region's blood services. The four points representing the regions of Western Macedonia, the Ionian Islands and the North and South Aegean Islands, with very low average collection and the lowest proportions of volunteers, are noticeably separated from the rest.

Table 1 also shows each region's blood collection from volunteers in proportion to the population eligible to give blood (18-65 years). The numerator is the number of blood units collected from volunteers, not the number of volunteers, since the latter is not known. There is a very wide range of variation, from the exceptionally low figures in Central Greece and the Southern Aegean Islands, to a figure twice as high in Eastern Macedonia and Thrace. It is noticeable that several regions with a blood centre – Crete, Epirus, and Eastern Macedonia and Thrace – have the highest rates. In contrast, Western Greece and Thessaly, both of which have blood centres and have relatively high urban populations, do not do particularly well on this index.

Given the importance of voluntary blood donation, an efficient blood service places great emphasis on retaining volunteer donors and encouraging them to become regular donors. Regular donors are expected to be safer than first time donors – the same social factors that influence a person's decision to become a donor probably also influence the decision to continue, and the regular donor's greater awareness of issues connected with blood transfusion will tend to lead to self-exclusion if there has been exposure to risk of infection. It is very regrettable that the available data in Greece do not provide information on donors broken down by frequency of donation.

3. Prevalence of infected blood units

Blood services should report to the Ministry of Health on a six-monthly basis the results of their screening tests. Apparently, not all services do report since the tables issued by the Ministry do not include all services. Hence the number of units appearing in Table 2 differs from that shown earlier. This table shows the percentages of blood units by region in 2001 that were tested and confirmed positive for the two numerically most important blood-transmissible infectious diseases, hepatitis B and C, and also for HIV. The rate of detection of anti-HIV is

low and is not significantly different between the regions (X^2_{12} = 10.5, exact P-value = 0.52). The rates of detection of the markers of hepatitis B and C are both statistically highly significantly different between regions. Of course, this has probably much more to do with the geographical epidemiology of these diseases than with the working of the blood services. Full analysis of the phenomenon requires detailed data on the individual characteristics of the seropositive donors and on the healthy donors. The former is now being provided in part by the Hellenic Coordinating Haemovigilance Centre (Politis *et al.*, 1999), but the latter will only start to become available with the computerization of the blood services, which is to begin shortly on a pilot basis.

4. Conclusions

The main point that we intend to emerge from the above concerns the regional distribution of volunteer blood donorship. This severe inequality is a problem that can be tackled, whereas the distribution of seropositivity for markers of hepatitis that we have also shown is an intrinsically geographical problem. As stated earlier, voluntary non-remunerated blood donation is the acknowledged starting point for a safe supply of blood, and safe blood should be available to all. Although blood donorship is related to socioeconomic and demographic factors (Politis *et al.*, 1990), and hence some regional variation is inevitable, it is not acceptable that the percentage of blood obtained from volunteers in one region should be half of the percentage in another, or that an equally wide variation should exist in the rate of blood collection from the age-eligible population. The inevitable conclusion is that many blood services should have been doing more to recruit and retain volunteer donors. If reforms to the blood services' system permit more coordination of recruitment programmes and lead to their general improvement, an important contribution to the country's health will have been made. It is also to be hoped that reforms will improve the range, quality and completeness of the data that are collected.

REFERENCES

- European Commission (2000), *Opinion on the Quality and Safety of Blood.* SANCO/SCMPMD/2000/0005 Final: Scientific Committee on Medical Products and Medical Devices, European Commission, Luxembourg.
- Hellenic Haemovigilance Coordinating Centre (2003), *Epidemiological*

surveillance of infections in blood donors / Serious adverse events associated with blood transfusion. Ministry of Health and Social Welfare, Athens.

- Politis, C., Kavallierou, L., Tsiroyanni, P., Damaskos, P., Richardson, C. & Tzala, E. (1999), The aims of haemovigilance and design of the issue – Epidemiological investigation of transfusion-transmissible viral infections and the operation of blood services in 1997. *Hellenic Archives of AIDS* 7, 283-294.
- Politis, C., Richardson C., Evstathiadis, G. & Yfantopoulos, J. (1990), Blood donation in the Greek urban and semi-urban population. *Iatriki* 57, 130-135.

Table 1. Total domestic blood collection and blood collection from volunteers, by region of Greece, 1996 and 2001.

	1996		2001		
Region	Blood units	Volunteers (%)	Blood units	Volunteers (%)	Volunteers per 1000 population*
E.Macedonia - Thrace	35676	36.2	40144	36.1	115.4
Central Macedonia	98110	43.6	109602	41.7	94.0
Western Macedonia	12762	19.3	14904	29.2	93.6
Thessalia	29541	31.7	34378	41.6	80.1
Epirus	15252	47.4	16984	47.4	99.8
Ionian Islands	8664	35.3	8883	31.8	85.8
Western Greece	29801	48.0	32373	52.5	84.9
Central Greece	14260	40.7	17415	41.9	63.5
Peloponnese	26691	41.0	24824	42.0	81.8
Attiki	238771	36.9	237186	41.4	87.0
N.Aegean Islands	5291	35.0	8527	30.6	88.8
S.Aegean Islands	7871	18.8	8488	26.3	55.2
Crete	26666	38.0	30207	34.1	101.3
Total	549356	38.3	583915	40.7	88.4

Source: Regional aggregation of data on blood services from the Ministry of Health and Welfare

* Blood units collected from volunteers per 1000 population aged 18-65 years

Table 2. Prevalence per thousand blood units of markers of HIV (anti-HIV), hepatitis B (HBsAg) and hepatitis C (anti-HCV) in blood donations, by region, 2001.

Region	Units	anti-HIV	HBsAg	anti-HCV
E.Macedonia-Thrace	32954	0	5.83	1.67
C.Macedonia	110981	0.045	3.62	0.84
W.Macedonia	11652	0.086	5.24	0.52
Thessalia	35127	0.057	6.24	0.83
Epirus	16950	0	2.60	0.41
Ionian Islands	10098	0	1.78	0.50
Western Greece	30637	0	3.82	0.46
Central Greece	15390	0.065	14.88	1.24
Peloponnese	21241	0	4.19	0.89
Attiki	227957	0.070	4.01	0.86
N.Aegean Is.	5069	0.197	2.17	0.40
S.Aegean Is.	6734	0	5.35	0.74
Crete	30670	0.065	1.99	0.69
Total	555460	0.050	4.31	0.85

Source: Regional aggregation of data on blood services from the Ministry of Health and Welfare.

Figure 1. Percentage of the region's blood donations obtained from volunteers versus the average size of the region's blood services, 2001.