Stroke Mortality and Case-Fatality Rates in Three Geographic Areas of Finland From 1983 to 1986

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Background and Purpose: Our aim was to describe the mortality and early case-fatality rates of stroke in three geographic areas of Finland during 1983 to 1986 by means of a community-based stroke register and to estimate the accuracy of registration of stroke deaths in the official statistics compared with the FINMONICA stroke register.

Methods: Annual and average mortality and case-fatality rates of stroke were derived from data collected in the FINMONICA stroke register during 1983 to 1986. Age-specific and age-standardized rates were calculated for the three areas, and the results were compared with the official mortality statistics and with the case-fatality figures published previously in the literature for Finland and elsewhere.

Results: Mortality from stroke in the three FINMONICA areas was between 73 and 90 per 100 000 per year among men aged 25 to 74 years and between 42 and 55 per 100 000 per year among women in the same age group. Average case-fatality was similar in the three areas and globally high: 20% to 27% in men and 24% to 28% in women. Approximately half of the fatal strokes occurred within less than 2 days from the onset of the attack, and a further 25% within the first week. Hemorrhagic strokes accounted for 54% to 81% of all fatal strokes occurring in less than 2 days among men, while among women the corresponding proportions varied in the three areas between 35% and 74%. Of cerebral infarctions, approximately 28% to 37% among men and 19% to 20% among women were fatal within less than 2 days. Although the number of fatal strokes was similar in both the FINMONICA register and official mortality statistics, only 82% to 85% of the stroke cases were common in both registers; a further 13% to 14% of the cases classified as stroke deaths in the FINMONICA register could also be found in the official mortality statistics, but the underlying cause of death was something other than stroke.

Conclusions: The reliability of the Finnish official mortality statistics with regard to stroke deaths is reasonably good in aggregate numbers, but at the individual level considerable discrepancies seem to occur. Mortality from stroke in Finland has not declined further after 1979 and remains high internationally. Early case-fatality of stroke also seems higher in Finland than in most other countries. We believe that both the high incidence of stroke and the severity of the attacks are contributing to mortality and case-fatality rates of stroke in Finland. (Stroke 1993;24:1140-1147)

KEY WORDS • cerebrovascular disorders • Finland • mortality

According to studies based on routine mortality statistics, stroke mortality declined during the 1970s in most industrialized countries, except in some countries in Eastern Europe.1-9 In Finland the trend leveled off after this time,10,11 although Finland still is one of the countries with high mortality rates from stroke.1,2,12 Furthermore, according to official statistics, mortality from stroke is higher in eastern than in western and southwestern Finland,13 although the regional differences are smaller for stroke than for coronary heart disease.14,15 There is no reason to doubt that the declining trend in stroke mortality in Finland or in other western countries has been real. Nevertheless, the reliability of the official mortality statistics has not been assessed previously in a systematic way. Potentially, complications occurring during the long hospitalization of a stroke patient (such as secondary infections) may cause bias in the coding of the causes of death. The case-fatality rate contains even more uncertainty because of problems in selection of cases and diagnostic classification of the nonfatal cases.

In Finland, stroke registration is carried out in three geographic areas. The FINMONICA (Finnish part of the World Health Organization [WHO] MONICA Project)16 stroke register contains information about death from stroke within 28 days from the onset of the attack. The stroke registers participating in the WHO MONICA...
Project\textsuperscript{17} pay particular attention to the completeness of case-finding and use standardized criteria for diagnostic classification. The aim of the present report was to examine early mortality from stroke in the three FINMONICA areas independently from the official mortality statistics and to check the accuracy of the latter. Second, we have been able to assess the case-fatality of stroke in an unselected population-based group of acute stroke cases and to determine case-fatality for different types of stroke. Third, we compared recent case-fatality rates with those from previous studies.

**Subjects and Methods**

A detailed description of the FINMONICA stroke register has been published elsewhere\textsuperscript{16}; only the main features concerning the registration of fatal events will be presented here. The provinces of North Karelia and Kuopio in eastern Finland, the city of Turku, and the town of Loimaa with a surrounding area in southwestern Finland are the target areas where the stroke register has been established. Although a stroke register has been operating in North Karelia since 1972,\textsuperscript{18} the FINMONICA stroke register was formally established at the beginning of 1982; at the same time the registration was also started in Turku and Loimaa, while stroke registration in Kuopio started at the beginning of 1983.

The data collected in the Loimaa area, which is too small to be studied alone, were pooled with those of the neighboring town of Turku, and the pooled area is hereafter referred to as Turku/Loimaa. The present analyses include data gathered during the period 1983 to 1986. In 1987, the 9th version of the International Classification of Diseases (ICD) was adopted in Finland. Since this might have influenced the classification of the different types of stroke, we decided to evaluate the problem in subsequent analyses of the FINMONICA stroke register data. The age range of the population included in the register is 25 to 74 years. In 1984 the population studied included 386 061 persons. Of them, 105 098 (52 359 men and 52 739 women) lived in North Karelia, 152 543 (74 662 men and 77 881 women) lived in Kuopio, and 128 420 (60 216 men and 68 204 women) lived in Turku/Loimaa.

The main sources of information for the registration of stroke events in the FINMONICA stroke register were the admission diagnoses to the hospital; hospital discharge diagnoses and diagnoses from death certificates also were checked routinely.\textsuperscript{16} All patients with symptoms and signs suggesting acute cerebrovascular disease, aged 25 to 74 years and permanently residing in the target areas, were evaluated for registration. The data were collected and coded by nurses especially trained for the registration of stroke. After 28 days from the onset of the attack, the stroke record form was filled out for information concerning the 28-day attack period. For fatal cases, the causes of death, duration of survival, and autopsy findings were recorded. Finally, the local stroke register physician (an internist in Loimaa and a neurologist in the other areas) checked the forms and assigned the diagnostic category and the type of stroke according to the MONICA stroke register criteria.\textsuperscript{17,15} At the National Public Health Institute the FINMONICA stroke register data are annually cross-checked with the computerized National Death Register for completeness. If a stroke diagnosis is found in the latter but the subject is not in the FINMONICA stroke register, the information about the case is sent to the local register team for evaluation. All cases with a stroke as underlying cause of death are entered into the register, but their diagnostic classification is, of course, decided according to the MONICA criteria by the local register physician.

According to the definition of the WHO MONICA Project,\textsuperscript{37} the diagnosis of stroke was based on "sudden onset of clinical signs of focal or global disturbance of cerebral function lasting more than 24 hours (except in cases of sudden death or if the development of symptoms is interrupted by a surgical intervention) with no apparent cause other than a vascular origin."

Three diagnostic categories could be assigned to the event by the local physician: definite stroke, no stroke, or insufficient information. For the classification of the type of stroke, the following ICD codes were accepted (8th revision): ICD code 430 for subarachnoid hemorrhage (SAH), ICD code 431 for intracerebral hemorrhage (ICH), ICD codes 432 and 433 for thrombotic cerebral infarction (TCI), ICD code 434 for embolic cerebral infarction (ECI), and ICD code 436 for unspecified type (UT).

The stroke was classified as first event if there was no evidence of a previous stroke event in the patient’s history. If the patient suffered from a new acute cerebrovascular accident within 28 days from the onset of the first event, the attack was considered to belong to the same event; if the first episode had occurred more than 28 days before the onset of the new attack, the event was classified as recurrent stroke and a new register form was filled out. Fatal events were those in which the survival time was less than 28 days.

In this report, fatal events classified as definite stroke and insufficient information were both included in the calculation of mortality rates. On average, during the period studied 4.3% of the fatal cases registered were classified as insufficient information; all of them occurred in people older than 55 years. However, the proportion of insufficient information in the whole register declined from 4.9% in 1983 to 2.3% in 1986. Mortality from all strokes, both annual and average for the years 1983 to 1986, was calculated for all events and first events only. In early case-fatality, death occurred within 28 days from the onset of the attack. The day of onset was considered as day 0. The distribution of the fatal cases within 1 day or less, 2 to 6 days, and 7 to 27 days from the onset of the stroke attack was calculated.

On average, a necropsy had been performed in 41% of the fatal strokes. In Turku/Loimaa, a necropsy had been performed in 65% of the fatal strokes, while in Kuopio and North Karelia the proportions were 34% and 26%, respectively. Approximately 63% of SAH and 62% of ICH had been diagnosed on the basis of a necropsy, while the respective proportions for TCI and ECI were 33% and 41%. In contrast, a necropsy had been done in only 3% of the cases classified as UT. During the period studied, the percentage of computed brain tomography (CT) performed in these fatal strokes was rather low (18%), although it increased from 12% in 1983 to 20% in 1986. CT facilities were unevenly distributed in the three areas: 61.4% were performed in Kuopio, 26.2% in Turku/Loimaa, and only 12.4% in North Karelia. Altogether, about 59% of the fatal...
Strokes were diagnosed on the basis of necropsy or CT scan or both. More precisely, necropsy, CT scan, or both had been performed in 72% of fatal SAHs, 79% of fatal ICHs, 47% of fatal TCI s, 45% of fatal ECI s, and in only 3% of fatal UT s.

The rates were calculated by 10-year age groups. The 95% CIs were calculated assuming the Poisson distribution. The direct method was used for age standardization, according to the practice in the WHO MONICA Project. The age distribution of Segi’s 1982 truncated world population was used as the standard.20 Case-fatality was age standardized using weights proposed for use in the WHO MONICA Project. The weights were derived from the age distribution of coronary and stroke events in pooled MONICA populations: 1, 3, 5, 7, 12 for the age groups 25 to 34, 35 to 44, 45 to 54, 55 to 64, and 65-74, respectively. The stroke cases in the official mortality statistics were compared with those in the FINMONICA stroke register using the unique identification number of each resident in Finland.

**Results**

Because death certificate diagnoses were routinely checked, all the stroke cases registered in the official mortality statistics were also found in the FINMONICA stroke register. Approximately 67% of the fatal cases registered in the FINMONICA stroke register had been assigned a stroke diagnosis as the underlying cause of death in the official mortality statistics (Fig 1). On the other hand, for about 15% of the stroke cases of the FINMONICA stroke register, the underlying cause of death in the official mortality statistics was not a stroke, although stroke was mentioned as an intermediate or immediate cause of death. Conversely, about 13% of the cases whose underlying cause of death was a stroke in the official mortality statistics had been assigned to the category “no stroke” by the FINMONICA stroke register team. The category “other” in Fig 1 consists of a few suspected stroke cases that were not identified as strokes in FINMONICA after validation, and whose underlying cause of death was not a stroke.

During the period 1983 to 1986, 622 fatal strokes were found in men and 551 in women, representing 24% and 26% of all strokes, respectively (Table 1). The annual age-standardized mortality from first and all strokes did not significantly vary within or between the study areas during the 4 years studied. Approximately 45% to 57% of fatal strokes occurred in men aged 65 to 74 years; among women of the same age the proportion was slightly higher, from 60% to 70% (Table 2). For the cases classified as SAH, the mean age was 53.1 years; for ICH mean age was 60.3 years, for TCI 66.4, and for ECI 67.1. On average, women suffered from an SAH 5.4 years later than men; from an ICH, 5.0 years later than men; for a TCI, 2.5 years later than men; and for an ECI, 5.4 years later than men. Only for UT was the mean age similar (68.8 years) in men and women. Finally, for the cases classified as insufficient data, the mean age was 66.1 years, and women were on average 1 year older than men.

**Table 1. Number of Fatal Strokes, Annual Age-Standardized Mortality per 100 000 Persons, and 95% CI in the FINMONICA Areas by Sex and Year.**

| Sex | Year | North Karelia | | Kuopio | | Turku/Loimaa |
|-----|------|--------------|-----|--------|-----|-------------|-----|--------|-----|
|     |      | Fatal events | Mortality per 100 000 | Fatal events | Mortality per 100 000 | Fatal events | Mortality per 100 000 |
| M   | 1983 | 40          | 76              | 72          | 95              | 45          | 71              |
|     | 1984 | 45          | 82              | 59          | 78              | 51          | 79              |
|     | 1985 | 50          | 91              | 63          | 83              | 42          | 65              |
|     | 1986 | 57          | 108             | 69          | 64              | 49          | 78              |
|     | 1983-1986 | 192   | 90              | 243         | 80              | 187         | 73              |
|     | 95%CI |              | 77-103          | 70-90       | 62-84           |
| F   | 1983 | 34          | 47              | 60          | 54              | 55          | 51              |
|     | 1984 | 23          | 31              | 64          | 62              | 41          | 42              |
|     | 1985 | 53          | 72              | 66          | 62              | 34          | 35              |
|     | 1986 | 39          | 54              | 44          | 42              | 38          | 38              |
|     | 1983-1986 | 149   | 51              | 234         | 55              | 168         | 42              |
|     | 95%CI |              | 42-60           | 48-62       | 35-49           |

CI, confidence interval.
TABLE 2. Average Annual Mortality and Case-Fatality of Stroke per 100 000 Persons in the FINMONICA Areas During 1983-1986 by Sex and Age

<table>
<thead>
<tr>
<th>Sex</th>
<th>Age group (y)</th>
<th>North Karelia</th>
<th>Kuopio</th>
<th>Turku/Loimaa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of strokes</td>
<td>Mortality per 100 000</td>
<td>Case-fatality (%)</td>
<td>No. of strokes</td>
</tr>
<tr>
<td>M</td>
<td>25-34</td>
<td>8</td>
<td>13</td>
<td>38.1</td>
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<tr>
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<td>32.6</td>
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<tr>
<td></td>
<td>45-54</td>
<td>30</td>
<td>73</td>
<td>27.3</td>
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<tr>
<td></td>
<td>55-64</td>
<td>49</td>
<td>145</td>
<td>22.9</td>
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<td></td>
<td>65-74</td>
<td>90</td>
<td>389</td>
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Age-standardized rate

<table>
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<th>Sex</th>
<th>Age group (y)</th>
<th>North Karelia</th>
<th>Kuopio</th>
<th>Turku/Loimaa</th>
</tr>
</thead>
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<tr>
<td>F</td>
<td>25-34</td>
<td>5</td>
<td>10</td>
<td>62.5</td>
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<tr>
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<td>45-54</td>
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<td>37.8</td>
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<tr>
<td></td>
<td>55-64</td>
<td>31</td>
<td>75</td>
<td>24.2</td>
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<td></td>
<td>65-74</td>
<td>93</td>
<td>248</td>
<td>26.7</td>
</tr>
</tbody>
</table>

CI, confidence interval.
*The direct method was used for age standardization.
†Standardization for case-fatality was based on weights derived from pooled MONICA populations (see text).

Mortality from stroke increased with age, and it was higher in men than in women (Table 2). Mortality among men within each age group was similar in the three areas. The high mortality rate found among 55- to 74-year-old women in Kuopio translated into an age-standardized mortality slightly higher than that of women living in the other areas. The male-female ratio of fatal stroke varied between 1.7 and 1.5 in the different FINMONICA areas.

In men of Kuopio the case-fatality rate was lower than in men of North Karelia and Turku/Loimaa (Table 2). In women the trend was similar, but the difference between the areas was not significant. The case-fatality rate of all strokes did not increase with age; however, when only atherothrombotic strokes were considered, an increase in case-fatality with age was evident. In women younger than 45 years, case-fatality in North Karelia was twice that in Turku/Loimaa and three times that in Kuopio. Among men, case-fatality from cerebral infarction was lowest in Kuopio and highest in North Karelia (P<.05) (Table 3). In general, case-fatality was higher for hemorrhagic than thrombotic strokes. A high case-fatality was found also for unspecified type of stroke, mainly because data in many fatal cases were insufficient to assign the type of stroke.

TABLE 3. Number of Fatal Events, Age-Standardized Mortality per 100 000 Persons, and Case-Fatality of Stroke in the FINMONICA Areas During 1983-1986 by Sex and Type of Stroke

<table>
<thead>
<tr>
<th>Sex</th>
<th>Type of stroke</th>
<th>No. of strokes</th>
<th>Mortality per 100 000</th>
<th>Case-fatality (%)</th>
<th>No. of strokes</th>
<th>Mortality per 100 000</th>
<th>Case-fatality (%)</th>
<th>No. of strokes</th>
<th>Mortality per 100 000</th>
<th>Case-fatality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>SAH</td>
<td>49</td>
<td>24</td>
<td>50.5</td>
<td>53</td>
<td>17</td>
<td>46.1</td>
<td>30</td>
<td>13</td>
<td>55.6</td>
</tr>
<tr>
<td></td>
<td>ICH</td>
<td>27</td>
<td>14</td>
<td>57.4</td>
<td>42</td>
<td>14</td>
<td>47.2</td>
<td>55</td>
<td>22</td>
<td>59.8</td>
</tr>
<tr>
<td></td>
<td>TCI</td>
<td>78</td>
<td>36</td>
<td>17.8</td>
<td>94</td>
<td>31</td>
<td>11.4</td>
<td>59</td>
<td>23</td>
<td>13.5</td>
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<tr>
<td></td>
<td>ECI</td>
<td>14</td>
<td>6</td>
<td>20.9</td>
<td>26</td>
<td>9</td>
<td>20.2</td>
<td>18</td>
<td>7</td>
<td>21.4</td>
</tr>
<tr>
<td></td>
<td>UT</td>
<td>20</td>
<td>9</td>
<td>45.5</td>
<td>13</td>
<td>4</td>
<td>31.7</td>
<td>11</td>
<td>4</td>
<td>35.5</td>
</tr>
<tr>
<td>F</td>
<td>SAH</td>
<td>36</td>
<td>17</td>
<td>48.0</td>
<td>47</td>
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<td>48.5</td>
<td>19</td>
<td>6</td>
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<tr>
<td></td>
<td>ICH</td>
<td>17</td>
<td>6</td>
<td>56.7</td>
<td>36</td>
<td>9</td>
<td>51.4</td>
<td>45</td>
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<td>57.7</td>
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<tr>
<td></td>
<td>TCI</td>
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<td>16</td>
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<td>3</td>
<td>41.9</td>
<td>12</td>
<td>3</td>
<td>42.9</td>
</tr>
</tbody>
</table>

SAH, subarachnoid hemorrhage; ICH, intracerebral hemorrhage; TCI, thrombotic cerebral infarction; ECI, embolic cerebral infarction; UT, unspecified type.
Among men, approximately half the fatal events occurred during the first 48 hours from the onset of stroke, and approximately three of four occurred during the first week (Fig 2). As expected, a high proportion of deaths from hemorrhagic stroke occurred during days 0 and 1 (63% to 81% for SAH and 54% to 80% for ICH). Approximately 28% to 37% of deaths from cerebral infarctions (ECI was pooled with TCI in this analysis) occurred within the first day and a further 32% to 38% within 2 to 6 days from the onset. In women, the proportion of fatal cases during days 0 and 1 was slightly lower than that among men (39% to 45%). Only 19% to 20% of deaths from cerebral infarction occurred during that period. In addition, in women most of the deaths from hemorrhagic stroke occurred during the first 48 hours. The cumulative case-fatality in men and women was similar from the first week on.

**Discussion**

Using the personal identification number that every resident in Finland is assigned, we could compare the information on each subject in the FINMONICA stroke register with the official mortality data collected by the Central Statistical Office of Finland. Although the case ascertainment of stroke deaths in the official mortality statistics is satisfying, the quality of those data requires careful validation. In fact, 13% of the stroke deaths could not be confirmed on the basis of the MONICA criteria for diagnosing stroke; furthermore, for about 14% to 15% of the stroke cases registered in the FINMONICA stroke register, the underlying cause of death was not a stroke in the official mortality statistics, although a stroke diagnosis was mentioned as a contributing cause of death. About two thirds of these case patients died, according to official registration, from high blood pressure or cardiac problems (ICD-8 diagnoses: 402 to 404, 410 to 412, 420 to 427), which may have been legitimate choices in some cases. We may conclude that the use of the underlying cause of death without further validation of the other causes of death can lead to bias in the estimation of stroke mortality.
Most of the epidemiological and clinical studies of stroke mortality are based on routine mortality statistics, and discrepancies between earlier studies may be due to inaccurate validation of the diagnosis of fatal strokes, particularly in populations where autopsies are not commonly made.

Our present results confirm the earlier findings based on the official mortality statistics, showing that the mortality from stroke in Finland has not declined further after 1979. Finland is still one of the countries with the highest mortality from stroke, and the leveling off of the declining trend is alarming. However, a longer study period is needed for careful evaluation of trends. Total stroke mortality increased with age and was higher in men than in women. The male-female ratio of fatal stroke for the entire period studied was 1.7 in North Karelia, 1.5 in Kuopio, and 1.7 in Turku/Loimaa, similar to the ratio calculated for stroke incidence. The high ratio is in part due to the age range of the stroke register, since only events in people aged 25 to 74 years are included. This finding is in accordance with previous results on population segments of the same age, while in older people stroke mortality is similar across the sexes.

Although the FINMONICA register had suggested an east-west gradient for stroke incidence, mortality from stroke was similar in the three areas. At the same time the recurrence rate was similar in the three areas, so that higher recurrence can be excluded as a cause of high case-fatality in southwestern Finland. In addition, case-fatality was similar in Turku/Loimaa (in southwestern Finland) and in North Karelia (in eastern Finland), but lower in Kuopio (also in eastern Finland). The low case-fatality rate detected in the latter area was due to the higher amount of nonfatal mild cerebral infarctions detected. In fact, a separate quality assurance investigation on nonfatal stroke in FINMONICA showed that approximately half of the variation in incidence of nonfatal stroke was due to coding procedures. CT more often supported the diagnosis of stroke in Kuopio compared with North Karelia and Turku/Loimaa, and most probably there was a better detection of mild strokes in that area than in the others. How much improved diagnostics influences case-fatality is, however, unclear because case-fatality in Kuopio was significantly lower among men but not among women. Finally, our findings diverge from the results of the study by Koskinen et al concerning Finland as a whole during 1971 to 1975. In summary, in FINMONICA during the first years of registration, a mild east-west gradient could be observed in stroke incidence but not in stroke mortality and case-fatality.

The studies that have described the case-fatality of stroke are summarized in Tables 4 and 5. It is obvious that the case-fatality rate at 1 month tends to be lower elsewhere than in Finland, with the possible exception of Kuopio. Although the studies are only roughly comparable, the data suggest that stroke in Finland may be a more severe disease than in most other countries. Large hemorrhages and larger occlusions of cerebral vessels, rather than lacunar infarctions, may be more frequent in Finland than in other countries. During the last years the number of CTs performed has considerably increased, and an epidemiological study on the pathological aspects of stroke in Finnish people is now feasible and should be done to clarify this point. High levels of cardiovascular risk factors, in particular blood pressure, support this speculation. In addition, high mortality and case-fatality from hemorrhagic stroke, particularly from SAH, is one cause of the high overall mortality and case-fatality of stroke in Finland. Hemorrhagic stroke represents about 20% of all strokes and 40% of all fatal events, and it has a high case-fatality rate of more than 50% within 4 weeks from the onset. On the other hand, most strokes are of thrombotic or embolic origin, and the main reasons for the leveling off of the decline in stroke mortality are to be searched for in this subgroup.

It is important to determine the reasons for the high mortality and case-fatality from stroke in such a high-
risk population as in Finland to prevent excessive stroke deaths. Hypertension is the main known risk factor for stroke, and the Finnish blood pressure levels were found to be among the highest in the MONICA centers. It has been suggested that there is an inverse relation between mortality from stroke and effectiveness of hypertension treatment in Finland. A study on the development of hypertension care in Finnish patients showed that there has been some improvement in the control of hypertension during the years 1982 to 1987, although less than expected from the high proportion of subjects treated with antihypertensive drugs. Such a small improvement may not result in a decline in stroke mortality, at least in the short term, which is in accord with our data. It seems that the control of hypertension, when based almost entirely on the wide use of antihypertensive drugs, is insufficient. Some studies also indicate that the decline in stroke mortality that occurred in the 1970s in the United States and New Zealand can only partly be explained by the improvement in antihypertensive therapy. To disclose the causes of the changed trend in stroke mortality, future analyses should concentrate on the prevalence of the risk factors that are positively related to stroke death. Steps in this direction are being made, since attention has recently turned also to other risk factors, especially smoking, serum lipid levels, and diet.

The matter is complicated by the fact that it is rather difficult to determine by means of aggregate data the cumulative exposure to these risk factors over time, i.e., between the moment of the measurement of the baseline value and the moment of the event outcome. This is often the problem with the aforementioned studies on hypertension.

In conclusion, the results presented here have shown that although the aggregate data of the official mortality statistics on stroke seem fairly good, they need to be carefully validated. The results also document a high case-fatality rate of stroke during the first 4 years of the FINMONICA stroke registration, thus calling for further analyses that assess trends in stroke mortality and morbidity and their dependence on trends in cardiovascular risk factors in the community.

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