The epidemiology of total hip replacement in the Netherlands and Sweden

Present status and future needs

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ABSTRACT – By combining data from the Discharge registers and the census bureaus in The Netherlands and Sweden, we calculated the age-specific incidences of primary total hip replacement (THR), studied the demographic profile of the population receiving THR and predicted demands.

In the period 1986–1997, the number of THRs increased by 20% in Sweden to 10,000 operations (113/100,000 inhabitants) and by 68% to 17,400 operations (112/100,000 inhabitants) in The Netherlands. Of this increase 3% and 15% could be explained by changes in the age-profile and size of the population, respectively. Although the overall incidence of THR was similar in both countries in 1997, we found that, after correction for differences in population structure, the incidence of THR was 20% higher in The Netherlands. In Sweden, relatively more men were operated on than in The Netherlands. We also found that in Sweden, but not in the Netherlands, relatively more older people were operated on in 1997 than in 1987.

Assuming no further change in the age- and sex-specific arthroplasty rates, the predicted annual number of total hip replacements by the year 2020 will increase by at least one fourth in Sweden and almost one half in The Netherlands.

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The improvements in surgical technique, implant material, and design have led to excellent long-term results of THR with implant survival rates of 93% after 10 years (Malchau and Herberts 2000). In consequence, the demand for total hip replacement has increased. Another reason for the growing demand is the increasing number of elderly people. Because of capacity and budget restraints, many countries have waiting times for the procedure (Llewellyn-Thomas et al. 1998). To plan for future demands and costs, it is important to estimate the number of total hip replacements to be expected. We calculated age-specific incidences, studied the demographic profile of the population undergoing THR and predicted the number of THRs to be expected in The Netherlands and Sweden.

Patients and methods

We obtained information on all patients admitted to Dutch hospitals for total hip replacement in the period 1986–1997 from the National Medical Registration system as provided by Prismant, Institute for Healthcare Management. Swedish data were obtained from the Swedish Discharge register for the period 1987–1997. In The Netherlands, we obtained data on THR for every other year in the period 1986–1996 and 1997. We did not use data from the Swedish Hip Arthroplasty Register because no such register exists in The Netherlands and the Discharge registers can be more easily compared. The Swedish Hip Arthroplasty Register was validated by comparing it with the Discharge register (Söderman et al. 2000). Information was obtained about the number of primary total hip replacements. For every proce-

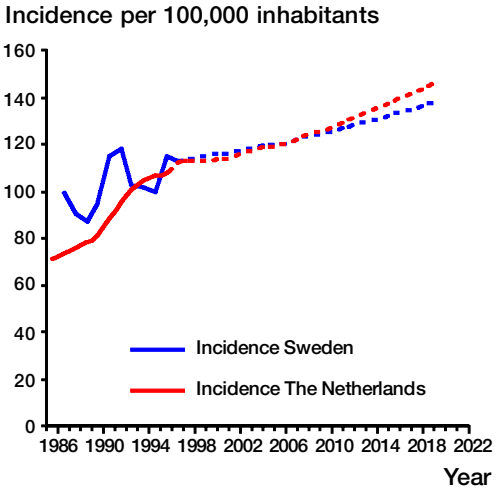


Figure 1. Incidence of total hip replacement per 10^5 inhabitants in the period 1986–2020 in The Netherlands and Sweden (predictions from 1997).

dure, the gender and age group of the patient were registered. We also obtained information on the (projected) demographic profile of the Dutch and Swedish populations from the Census Bureaus in both countries (Centraal Bureau voor de Statistiek (CBS), The Netherlands, and Statistiska Centralbyrån (SCB), Sweden). We calculated annual and age-specific incidences in both countries and estimated the need for primary total hip arthroplasty by using the projected changes in the Dutch and Swedish populations until 2020.

Results

We found an increase of 68% in the number of primary total hip replacements in The Netherlands from 10,359 operations in 1986 to 17,401 in 1997. This is an increase from 71 to 112 operations per 100,000 inhabitants (Figure 1). Only 15% of the increase in number of hip replacements could be explained by changes in the size and age-profile of the population. On the basis of the incidence of THR in 1997, we predicted the annual number of primary total hip replacements. Assuming no further change in the age- and sex-specific arthroplasty rates, the annual number of total hip replacements in The Netherlands by the year 2020 will increase by 44% to 25,090 operations.

In Sweden, the number of arthroplasties increased by 20% from 8,336 in 1987 to 10,015 in 1997, an increase from 99 operations to 113 operations per 100,000 inhabitants (Figure 1). Only 3% of the increase in number of hip replacements could be explained by demographic changes in the population. The number of THRs varied considerably each year. On the basis of the incidence of THR in 1997, the predicted annual number of THRs in Sweden by the year 2020 will rise to 12,773 operations, an increase of 28% compared with 1997.

When comparing the age of patients undergoing THR in the period 1986–1997, it turned out that in The Netherlands, the distribution of the age-groups had changed relatively little, but in Sweden, more elderly people were operated on in 1997 (39% over 75 years of age) compared to 1987 (28% over 75 years of age) (Figure 2).

Although the overall incidences of THR in 1997 were similar in both countries, it appears that the age-specific incidences for THR in women were higher in The Netherlands, while the age-specific incidences for THR in men were higher in Sweden

Age-standardized incidence of total hip replacement per 10^5 inhabitants in The Netherlands and Sweden in 1997

Age	Both genders		Men		Women	
	Netherlands	Sweden	Netherlands	Sweden	Netherlands	Sweden
< 44	4	4	4	4	4	5
45–54	51	52	45	46	57	58
55–64	229	206	151	190	306	223
65–74	570	431	328	391	768	465
75–84	713	560	383	445	905	640
> 85	408	381	281	289	452	422
Total	112	113	61	88	161	138

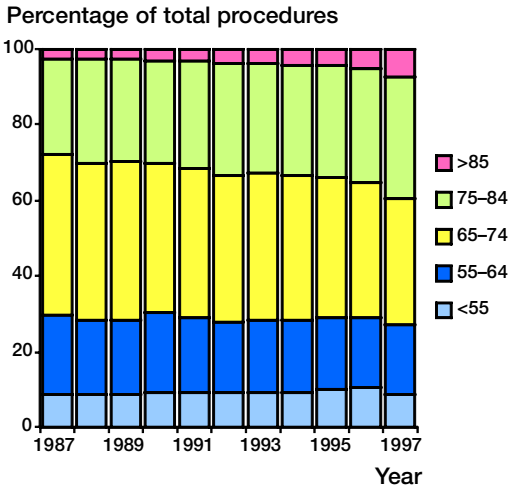
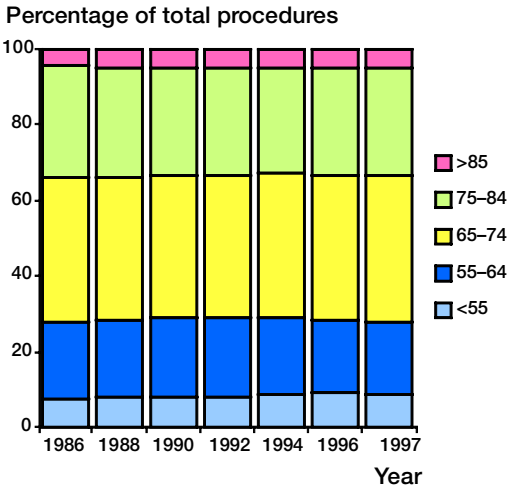


Figure 2. a. Percentage of patients in Sweden undergoing total hip replacement in various age-classes in different years.



b. Percentage of patients in The Netherlands undergoing total hip replacement in various age-classes in different years.

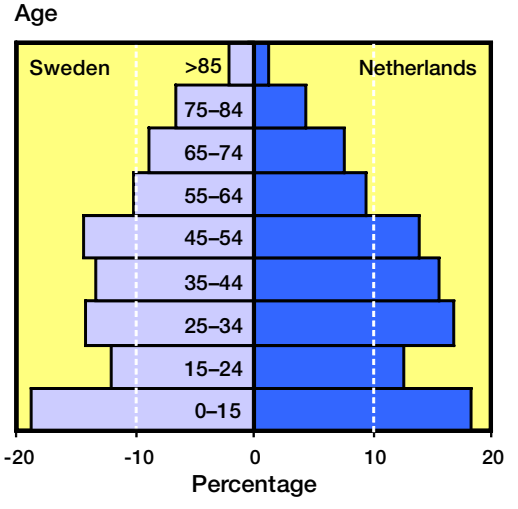


Figure 3. Population distribution in The Netherlands and Sweden in 1997. The Swedish population is older than the Dutch one.

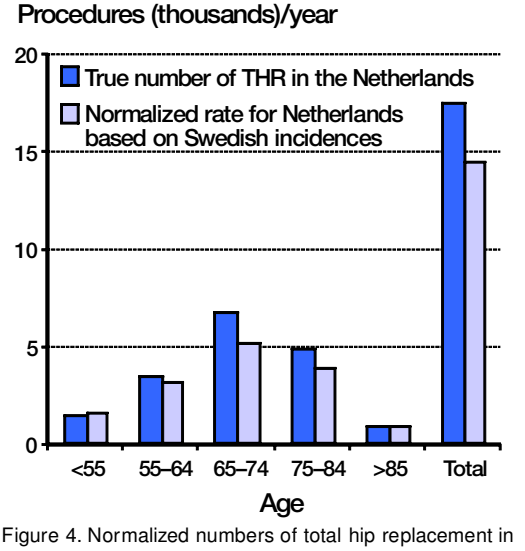


Figure 4. Normalized numbers of total hip replacement in The Netherlands. The dark blue bars indicate age-class rates for THR in 1997. The light blue bars indicate the number of procedures per year if the Swedish age-class data were applied to the Dutch population structure. Thus, incidence rates for The Netherlands and Sweden can be compared by taking into account differences in population structure between the two countries.

(Table). To correct for differences in the population profile (Figure 3), we calculated the number of total hip replacements in The Netherlands on the basis of the Swedish incidence of THR in various age-classes (Ingvarsson et al. 1999) (Figure 4). After correction for differences in population structure, the rate of THR in The Netherlands is 20% higher than in Sweden.

Discussion

From 1986 the number of THRs has been increasing in Sweden and The Netherlands. Only a small percentage of the increase could be attributed to demographic changes. We found that the proce-

dure has been offered to an increasing number of patients, who were previously regarded as too old or too sick (Friedman and Elixhauser 1993, Robertsson et al. 2000). The shift in age-classes of patients undergoing THR in Sweden over the period 1987–1997 may be due to Swedish orthopedic surgeons becoming more reluctant to operate on younger patients because of the disappointing results of THR in younger patients reported in the Swedish National Hip Register.

We found a difference in the gender ratio of the population undergoing THRs in both countries (Table). This could be explained by different rates of osteoarthrosis (OA), the main indication for THR (Malchau and Herberts 2000) in both genders in the Swedish and Dutch populations. Dutch studies have reported more radiological hip OA in women than in men, but in a Swedish study, the incidence was similar (van Saase et al. 1989, Danielsson and Lindberg 1997, Odding et al. 1998). However, these studies used different criteria to define OA radiologically and not all patients with radiological OA have symptoms. Hawker et al. (2000) reported that the degree of underuse of total hip and knee replacements is more than three times higher in women than in men, which could also be a factor in the lower incidence of THR in Swedish women. Another explanation could be that heavy physical work, which has been described as a risk factor for hip OA (Vingård et al. 1991), was commoner in Swedish men. A limitation of the current study is the difficulty of comparing index diagnoses for THR in both countries to explain differences in incidences, because no valid data on diagnoses were available from the Dutch Discharge register. This register has not been validated like the Swedish Discharge register (Söderman et al. 2000). However, because more than 99% of hospital stays are recorded in the Dutch register and the operation codes are clearly defined, we assume that it has the same validity as the Swedish one.

The variation in the number of THRs in Sweden is due to economic restrictions in the budgets for THR and does not reflect the need for this operation in the population (Söderman et al. 2000). As a result of a special program started in 1992 to guarantee treatment within three months, the incidence of THR increased greatly and the waiting-times decreased. The program was discontinued in 1993, with a resultant reduction in the number of operations and an increase in waiting-times (Socialstyrelsen 1997). In The Netherlands, the effect of extra funds to reduce waiting-times in The Netherlands was also limited. More operations could be performed, but the waiting list did not decrease because of a growing need (Laeven et al. 2000).

Our results also showed that the overall incidences of THR in various studies are difficult to compare due to differences in demographics, methods and reporting (Ingvarsson et al. 1999). The reason for the similarity in overall incidences of THR in each country in 1997 is that the population is generally older in Sweden than in The Netherlands (Figure 3). The reason for the difference in normalized incidence rates in The Netherlands and Sweden (Figure 4) is less clear. The population characteristics and the health care systems are quite similar. The higher incidence of THR in The Netherlands can be explained by a larger demand in the population, but also by differences in budgets for THR between the two countries.

Several variables are known to affect the need for arthroplasties (Birrell et al. 1999). No consistent trend of a change in the prevalence of osteoarthritis was found in Swedish or Dutch research (R.I.V.M. 1993, Danielsson and Lindberg 1997). 10 years ago comparable guidelines for THR were introduced in both The Netherlands and Sweden (Socialstyrelsen 1991, CBO 1994). However, it is not known whether these guidelines reduce the variation in surgery rates described in the literature (Peterson et al. 1992). As patients become better informed and more aware of present treatments, they may be less inclined to accept their disability and prefer treatment at an earlier stage of their disease. A British study showed, however, that the satisfaction of demand for total hip replacement in England, given the agreed criteria for surgery, is a realistic objective and requires a relatively small increase in the number of operations (7%) (Frankel et al. 1999). Therefore, the influence of changing demography will be the main variable in predicting arthroplasty rates.

The predicted annual increase of THRs on the basis of demographic changes until 2020 is greater in The Netherlands (44%) than in Sweden (28%). The effect of ageing of the population is greater in The Netherlands, due to a relatively larger and

more prolonged baby-boom phenomenon after the Second World War. Birell et al. (1999) reported an expected rise of 40% in the number of THRs from 1996 until 2026 in the United Kingdom. All developed countries with an ageing population will witness a similar process and the THR rate must be increased to satisfy the future needs for THR. The predictions of THR rates in our study should be considered as conservative because the demand for THR in Sweden and The Netherlands is not satisfied yet, as can be concluded from the current waiting-times for the procedure. The indications for THR will also probably be wider if the outcome continues to improve.

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