Waiting for orthopaedic surgery: factors associated with waiting times and patients’ opinion

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†At the time of study was known as the Swedish Federation of County Councils.

Abstract

Objectives. To assess waiting times for three groups of orthopaedic patients in Sweden and to identify factors explaining variations in waiting time. Also examined were factors associated with patients’ perceptions that waiting times were too long.

Design. Retrospective study.

Setting and study participants. Patients from orthopaedic units at 10 Swedish hospitals participated in the study. A questionnaire was sent to 1336 surgical patients (517 hip replacement, 321 back surgery, and 498 arthroscopic knee surgery) 3 months after surgery. Information extracted from the hospitals’ patient administrative systems was also used.

Outcome measures. Length of waiting time, socio-economic variables, hospital type, health-related quality of life, and opinion about waiting time. The data were analysed mainly using regression analyses.

Results. The overall response rate was 79%. In all pre-operative stages, waiting times were longest in the hip replacement group. Socio-economic variables were not consistent determinants of variation in waiting times except for working status in the back surgery group where working patients had shorter waiting times than non-working patients irrespective of phase of waiting time. Admission to a county/district county hospital, compared with a university/regional hospital, was associated with shorter time on the waiting list. Patients with better health-related quality of life had significantly longer waiting times for arthroscopic knee surgery by all waiting time measures. The length of wait was a significant predictor of the patients’ acceptance of waiting time. Patients’ influence over the date of surgery also appeared to affect their opinion about the waiting time.

Conclusions. Hospital-related factors are more important than patient characteristics as explanations of variations in waiting times for orthopaedic surgery. Patients value short waiting times and the possibility of influencing the date of surgery.

Keywords: orthopaedic surgery, patients’ opinion, regression analyses, waiting times, waiting lists

Waiting time is an instrument for rationing the demand for health services in publicly financed health care systems. However, health care systems based on public financing are often criticized for having long waits for elective surgery. Citizen discontent about waiting times has forced governments to learn more about the waiting list phenomenon and take steps to change policy.

In Sweden, where health care is financed by taxes, public confidence in health care remains strong, but people think that accessibility is the area that it is most important to improve [1]. A study by the Swedish Federation of County Councils showed that accessibility should be prioritized to improve patient satisfaction among certain patients [2].

Studies in the field of waiting times for elective surgery have varied in terms of patient setting, main objectives, and methodology. The unifying element is the focus on patients with non-life-threatening diseases. Some studies have focused on waiting time for elective surgery in general [3–5] whilst others have targeted specific groups [6–12]. This work is distinguished from previous studies in that we tried to capture the entire care process, and have collected information about waiting times from the patients and the hospitals (Figure 1).

One objective of this study was to assess the length of both patient-reported and hospital-reported waiting times. Another...

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objective was to investigate whether socio-economic variables, hospital type, health-related quality of life, and previous wait (earlier stages of waiting times in the health care process) are significant factors in explaining differences in waiting times. We also investigated factors associated with the perception that the time on waiting list for orthopaedic surgery was too long or totally unacceptable.

**Methods**

**Sample and data collection**

Included in the study were patients who had undergone orthopaedic surgery for hip arthrosis, herniated disc/spinal stenosis, or arthroscopic surgery for meniscus lesions. The patients were classified according to ICD-10 [13].

The patients came from 10 public hospitals in Sweden: three university/regional hospitals, six county hospitals, and one district county hospital. An administrator at each hospital consecutively registered patients who underwent surgery. Patients must have spent at least eight days on a waiting list to be included in the study.

Data were collected from the hospitals’ patient administrative systems and a mailed questionnaire to the patients during 1 year (August 2000–August 2001). Each hospital was asked to collect 60 individuals per ‘patients group’. As the number of operations performed at the hospitals varies substantially it was not possible for all of the hospitals to collect the demanded number of patients during the study period. The final sample included 1336 patients (517 hip replacement, 321 back surgery, and 498 arthroscopic knee surgery).

Information on patients’ time on waiting list for surgery was collected from the hospitals’ patient administrative systems or was calculated with the help of data in the patients’ records.
The patients were surveyed by a mailed questionnaire 3 months after the operation. A reminder, including a new questionnaire, was sent after 1 month to non-responders. Box 1 shows the questions on waiting times included in the questionnaire.

To measure the status of the patient’s medical problem, i.e. health-related quality of life, we used a modification of the generic measure Euroqol with five dimensions (EQ-5D) [14,15]. In accordance with the EQ-5D self-classifier, patients were asked to classify their health status in five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. The questionnaire asked patients to classify their health status, both before the operation and 3 months after the operation. Furthermore, we modified the EQ-5D self-classifier’s mobility dimension. Thus, instead of 'I am confined to bed', we defined severe problems as ‘no possibility to walk without means of walking stick, crutch or zimmer frame’.

According to the EQ-5D self-classifier, 243 health states can be generated (the states dead and unconscious have been added) [16]. As there is no Swedish tariff for EQ-5D health states the UK EQ-5D social tariff was used [17]. Some health states have a negative score in the UK tariff, i.e. worse than dead. In this study, as in others [18], health states worse than dead were given a score of 0 since the appropriate scaling of states has a negative score in the UK tariff, i.e. worse than dead. In this study, as in others [18], health states worse than dead were given a score of 0 since the appropriate scaling of states has a negative score in the UK tariff, i.e. worse than dead.

Statistical analyses

The impact of baseline factors (socio-economic variables, hospital type, time from start of the medical difficulties to the patient’s first contact with health care, time at previous stages of the care process, EQ-5D pre-operatively as reported by the patients) on socio-economic variables (sex, age, living arrangement, working status, education), hospital type, time from start of the medical difficulties to the patient’s first contact with health care, time at previous stages of the care process, EQ-5D pre-operatively as reported by the patients was assessed for each type of surgery separately in a univariate analysis. Since the waiting times did not have a normal distribution, the Wilcoxon two-sample test and the Kruskal–Wallis test were used.

Multiple linear regression models were used to assess variations in each of the following periods of waiting time (Figure 1):

(i) time from referral to first outpatient visit at the hospital as reported by the patient (waiting time model 1);
(ii) time from first outpatient visit at the hospital until the day of operation as reported by the patient (waiting time model 2);
(iii) patient’s time on waiting list as reported by the hospital (waiting time model 3).

The models were run separately for each of the surgical procedure studied.

The explanatory variables included in the three regression models were socio-economic variables (sex, age, living arrangement, working status, education), hospital type, time from start of the medical difficulties to the patient’s first contact with health care, time at previous stages of the care process, EQ-5D pre-operatively as reported by the patients.

Since waiting times are normally skewed towards shorter waits, their natural logarithm was used as the dependent variable, with the minimal wait set at 0.5 week. From this follows that the β coefficient in the regression models should be exponentiated for interpretation [e.g. β = 0.47 corresponds to exp (0.47) = 1.60, an increase of 60% per unit change in the independent variable].

Multiple logistic regression models were used to assess the effect of the following explanatory variables on the patients’ acceptance of their time on waiting list: socio-economic variables (see above), hospital type, time from start of the medical difficulties to the patient’s first contact with health care, time from referral to first outpatient visit at the hospital, time from first visit until day of operation, time on waiting list, EQ-5D post-operatively compared with EQ-5D pre-operatively as reported by the patient, opinion of the overall surgical outcome, option to influence the date of the operation and change the stipulated date for the operation. The odds ratios estimates are per month of waiting time.

The probability of rejection was set at 0.05. Statistical analyses were performed using SAS Enterprise Guide version 2.0.

Results

Study population

Of 1336 patients, 1060 (79%) answered the questionnaire. There were no major differences between responders and non-responders considering patient group, hospital, sex, age,
and time spent on waiting list. The numbers of answered questionnaires were: 452 for total hip replacement (87%), 258 for back surgery (80%), and 350 for arthroscopic knee surgery (70%). The patients represent three different orthopaedic groups, which are partly reflected in the baseline characteristics (Table 1).

### Length of waiting times

Irrespective of the phase of waiting time, the hip replacement group waited the longest and the arthroscopic knee surgery group waited the shortest time. On average the patient-reported waiting times were consistently longer than the hospital-reported waiting time in all patient groups (Table 2). The median waiting time to operation reported by the patients was 2 months, i.e. 67% longer than their time on waiting list reported by the hospital.

### Factors explaining differences in waiting times

**Hospital-reported time on waiting list.** Median waiting times for each type of surgery, by category of predictor variables are shown in Table 3. All linear regression models were adjusted for sex, age, living arrangement, education, working status, hospital type, EQ-5D, and previous wait.

In the multiple linear regression analysis, sex, age, and living arrangement were not associated with time on waiting list in any of the three patient groups (Table 4). In the back surgery group, working patients had shorter times on waiting list compared with non-working patients.

In all groups, the time on waiting list was shorter for patients admitted to a county/district county hospital compared with a university/regional hospital.

EQ-5D pre-operatively was a significant predictor of time on the waiting list in the arthroscopic knee surgery group. Patients with higher EQ-5D scores, i.e. better health-related quality of life, had longer waiting times.

A long delay before the first contact with health services and the time from referral to first hospital outpatient visit were associated with longer waiting list times in the hip replacement group. In the back surgery group a long delay before first contact with health services was associated with a longer time on waiting list.

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### Table 1  Socio-economic variables, hospital, and EQ-5D, by group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hip replacement</th>
<th>Back surgery</th>
<th>Arthroscopic knee surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n total = 452 %</td>
<td>n total = 258 %</td>
<td>n total = 350 %</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>181 (40)</td>
<td>126 (49)</td>
<td>230 (66)</td>
</tr>
<tr>
<td>Women</td>
<td>271 (60)</td>
<td>132 (51)</td>
<td>120 (34)</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤44</td>
<td>6 (1)</td>
<td>69 (27)</td>
<td>153 (44)</td>
</tr>
<tr>
<td>45–59</td>
<td>63 (14)</td>
<td>61 (24)</td>
<td>138 (39)</td>
</tr>
<tr>
<td>60–71</td>
<td>183 (41)</td>
<td>68 (26)</td>
<td>50 (14)</td>
</tr>
<tr>
<td>≥72</td>
<td>200 (44)</td>
<td>60 (23)</td>
<td>9 (3)</td>
</tr>
<tr>
<td>Living arrangement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living alone</td>
<td>149 (33)</td>
<td>66 (26)</td>
<td>62 (18)</td>
</tr>
<tr>
<td>Living with others</td>
<td>300 (67)</td>
<td>190 (74)</td>
<td>285 (82)</td>
</tr>
<tr>
<td>Working status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working</td>
<td>97 (21)</td>
<td>127 (49)</td>
<td>278 (79)</td>
</tr>
<tr>
<td>Not working (retired, unemployed, or unpaid work)</td>
<td>352 (79)</td>
<td>130 (51)</td>
<td>72 (21)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nine years compulsory school</td>
<td>342 (77)</td>
<td>199 (77)</td>
<td>168 (48)</td>
</tr>
<tr>
<td>Upper secondary school</td>
<td>22 (5)</td>
<td>27 (11)</td>
<td>81 (24)</td>
</tr>
<tr>
<td>University degree</td>
<td>82 (18)</td>
<td>30 (12)</td>
<td>98 (28)</td>
</tr>
<tr>
<td>Hospital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University or regional hospital</td>
<td>145 (32)</td>
<td>123 (48)</td>
<td>106 (30)</td>
</tr>
<tr>
<td>County or district county hospital</td>
<td>307 (68)</td>
<td>135 (52)</td>
<td>244 (70)</td>
</tr>
<tr>
<td>Modified EQ-5D before surgery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQ-5D = 0</td>
<td>129 (30)</td>
<td>126 (51)</td>
<td>29 (9)</td>
</tr>
<tr>
<td>0.01 ≤ EQ-5D &lt; 0.10</td>
<td>113 (27)</td>
<td>54 (22)</td>
<td>66 (20)</td>
</tr>
<tr>
<td>0.10 ≤ EQ-5D &lt; 0.60</td>
<td>104 (25)</td>
<td>44 (18)</td>
<td>91 (27)</td>
</tr>
<tr>
<td>0.60 ≤ EQ-5D ≤ 1.00</td>
<td>78 (18)</td>
<td>21 (9)</td>
<td>149 (44)</td>
</tr>
</tbody>
</table>

*1The numbers of patients were lower for living status, working status, highest education, and modified EQ-5D as some questionnaires were incomplete for these variables.*
Patient-reported waiting times. The above results were compared with the regression results from models of patient-reported waiting time (model 1 and model 2, Figure 1). Although consistency among the models is not strong, some similarities are worth noting. Sex, age, living arrangement, and education did not affect the waiting time in a coherent way in any of the three models (data not shown).

In the back surgery group, some consistency was found between the three models considering the influence of the working status factor. As in the time on waiting list model,

Table 2 Median and inter-quartile range (IQR) in months for waiting times as reported by patients and patients’ time on waiting list as reported by the hospital, by group

<table>
<thead>
<tr>
<th>Waiting time variable</th>
<th>Hip replacement</th>
<th>Back surgery</th>
<th>Arthroscopic knee surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient-reported waiting times</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time from referral to first outpatient visit at the hospital</td>
<td>5.0 (3.0–9.0)</td>
<td>3.0 (1.5–6.0)</td>
<td>2.0 (1.0–5.0)</td>
</tr>
<tr>
<td>Time from first outpatient visit at the hospital until day of operation</td>
<td>7.0 (4.0–12.0)</td>
<td>5.0 (2.0–9.0)</td>
<td>3.0 (1.0–5.0)</td>
</tr>
<tr>
<td>Waiting time reported by the hospital</td>
<td>5.6 (2.8–8.2)</td>
<td>2.1 (1.0–4.6)</td>
<td>1.8 (0.9–3.2)</td>
</tr>
</tbody>
</table>

Table 3 Median and inter-quartile range (IQR) in months for time on waiting list across predictor variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hip replacement</th>
<th>Back surgery</th>
<th>Arthroscopic knee surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>5.9 (3.2–8.5)</td>
<td>2.4 (1.1–5.0)</td>
<td>1.7 (0.9–3.2)</td>
</tr>
<tr>
<td>Women</td>
<td>5.4 (2.5–8.2)</td>
<td>1.9 (0.9–4.4)</td>
<td>1.9 (1.0–3.5)</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤44</td>
<td>6.6 (2.8–7.7)</td>
<td>1.5 (0.9–3.5)</td>
<td>1.5 (0.7–3.7)</td>
</tr>
<tr>
<td>45–59</td>
<td>5.9 (3.1–8.1)</td>
<td>1.4 (0.6–4.4)</td>
<td>1.8 (0.9–3.2)</td>
</tr>
<tr>
<td>60–71</td>
<td>6.2 (3.1–9.4)</td>
<td>2.6 (1.6–5.1)</td>
<td>2.8 (1.6–4.3)</td>
</tr>
<tr>
<td>≥72</td>
<td>5.3 (2.4–7.3)</td>
<td>3.3 (1.4–5.6)*</td>
<td>2.1 (1.7–4.1)*</td>
</tr>
<tr>
<td>Living arrangement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living alone</td>
<td>5.3 (2.7–8.1)</td>
<td>2.4 (1.0–5.3)</td>
<td>1.7 (0.9–2.6)</td>
</tr>
<tr>
<td>Living with others</td>
<td>5.9 (2.9–8.4)</td>
<td>2.1 (1.0–4.4)</td>
<td>1.8 (0.9–3.3)</td>
</tr>
<tr>
<td>Working status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working</td>
<td>5.9 (3.0–7.9)</td>
<td>1.5 (0.7–3.3)</td>
<td>1.7 (0.9–3.0)</td>
</tr>
<tr>
<td>Not working (retired or unemployed)</td>
<td>5.6 (2.8–8.3)</td>
<td>3.0 (1.4–5.5)**</td>
<td>2.0 (1.1–4.1)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nine years compulsory school</td>
<td>6.0 (2.9–8.5)</td>
<td>2.1 (1.0–4.9)</td>
<td>1.8 (1.0–3.5)</td>
</tr>
<tr>
<td>Upper secondary school</td>
<td>5.7 (3.3–7.7)</td>
<td>3.2 (1.0–8.3)</td>
<td>1.6 (0.6–3.0)</td>
</tr>
<tr>
<td>University degree</td>
<td>4.3 (2.3–7.5)</td>
<td>2.0 (0.9–3.0)</td>
<td>1.7 (0.8–3.1)</td>
</tr>
<tr>
<td>Hospital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University or regional hospital</td>
<td>7.0 (4.1–9.3)</td>
<td>3.5 (1.5–6.2)</td>
<td>2.1 (1.1–3.6)</td>
</tr>
<tr>
<td>County or district county hospital</td>
<td>4.9 (2.5–7.4)*</td>
<td>1.4 (0.7–3.1)**</td>
<td>1.6 (0.8–3.1)*</td>
</tr>
<tr>
<td>Modified EQ-5D before surgery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQ-5D = 0</td>
<td>4.6 (2.3–7.7)</td>
<td>1.8 (0.9–4.4)</td>
<td>0.8 (0.6–2.0)</td>
</tr>
<tr>
<td>0.01 ≤ EQ-5D &lt; 0.10</td>
<td>6.8 (3.6–9.2)</td>
<td>2.1 (0.9–4.9)</td>
<td>1.5 (0.7–3.0)</td>
</tr>
<tr>
<td>0.10 ≤ EQ-5D &lt; 0.60</td>
<td>5.3 (2.7–8.0)</td>
<td>2.3 (1.4–4.4)</td>
<td>1.7 (0.9–3.0)</td>
</tr>
<tr>
<td>0.60 ≤ EQ-5D ≤ 1.00</td>
<td>5.9 (3.2–8.2)*</td>
<td>2.5 (1.1–5.6)</td>
<td>2.2 (1.1–3.9)*</td>
</tr>
</tbody>
</table>

*P < 0.05, **P < 0.001.
working patients had shorter waiting times in the patient-reported time to operation model and in the time to first outpatient visit model.

While hospital type predicted time on waiting list in all three groups, it was only a significant determinant of the patient-reported time to operation in the back surgery group. Patients admitted to a county/district county hospital reported shorter waiting times than those admitted to a university/regional hospital. Similar trends with smaller differences were seen for the other groups (data not shown).

Better EQ-5D pre-operatively was associated with longer waiting times both to the first visit and until day of operation in the arthroscopic knee surgery group, but not in the hip replacement or back surgery groups.

**Patients’ perception of time spent on waiting list**

The majority of the patients thought the waiting time was acceptable (hip replacement 51%, back surgery 64%, and arthroscopic knee surgery 62%). Patients who assessed their time on the waiting list as acceptable had considerably shorter median times on waiting list (hip replacement: 4.9 months; back surgery: 1.6 months; arthroscopic knee surgery: 1.6 months) than patients who considered their waiting time ‘too long’ or ‘totally unacceptable’ (6.7 months, 4.4 months, and 2.5 months, respectively).

In the multiple logistic regression, longer time on waiting list was significantly associated with the perception that the time on waiting list was too long or unacceptable in all three patient groups: hip replacement OR 1.12, 95% CI 1.04–1.20, \( P = 0.001 \); back surgery OR 1.15, 95% CI 1.02–1.28, \( P = 0.02 \); and arthroscopic knee surgery OR 1.10, 95% CI 1.02–1.20, \( P = 0.02 \). The findings were similar for patient-reported waiting times.

Socio-economic variables and hospital type did not predict a negative view of time on the waiting list. Neither unchanged nor poorer EQ-5D post-operatively compared with pre-operatively was associated with dissatisfaction concerning the time on the waiting list (data not shown).

In the back surgery group, additional factors significantly associated with the perception that time on waiting list was too long or unacceptable were change in the stipulated date for the operation (OR 2.55, 95% CI 1.12–5.81, \( P = 0.026 \)) and discontent with the overall result of the operation (OR 3.43, 95% CI 1.37–8.61, \( P = 0.009 \)).

In the arthroscopic knee surgery group, patients who did not have the option to influence the operation date were more likely to perceive the waiting list time to be too long or unacceptable (OR 3.09, 95% CI 1.55–6.17, \( P = 0.001 \)).

**Discussion**

The study design allows us to investigate the entire period of waiting time. Usually, attention is directed solely towards patients’ time on the waiting list. From a patient’s perspective it is also important to consider other waiting periods that are part of the care process. A focus on ‘post referral’ waiting

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**Table 4** Results of multiple linear regression model assessing variations in time on waiting list (waiting time model 3)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hip replacement</th>
<th>Back surgery</th>
<th>Arthroscopic knee surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \beta )</td>
<td>( P )-value</td>
<td>( \beta )</td>
</tr>
<tr>
<td>Female sex</td>
<td>–0.05</td>
<td>0.53</td>
<td>–0.20</td>
</tr>
<tr>
<td>Age (per year)</td>
<td>–0.01</td>
<td>0.24</td>
<td>0.00</td>
</tr>
<tr>
<td>Living with others versus living alone</td>
<td>–0.02</td>
<td>0.84</td>
<td>0.03</td>
</tr>
<tr>
<td>Working status</td>
<td>Employed versus not employed</td>
<td>–0.02</td>
<td>0.85</td>
</tr>
<tr>
<td>Education</td>
<td>Upper secondary school versus 9 years compulsory school</td>
<td>0.12</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>University versus 9 years compulsory school</td>
<td>–0.34</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>County/district county hospital versus university hospital</td>
<td>–0.40</td>
<td>0.000</td>
</tr>
<tr>
<td>EQ-5D while on waiting list (per unit)</td>
<td>0.23</td>
<td>0.13</td>
<td>–0.28</td>
</tr>
<tr>
<td>Time before initial contact with health services (per month)</td>
<td>0.01</td>
<td>0.004</td>
<td>0.01</td>
</tr>
<tr>
<td>Time before first outpatient visit at the hospital (per month)</td>
<td>0.01</td>
<td>0.023</td>
<td>0.00</td>
</tr>
</tbody>
</table>
time instead of ‘time on waiting list’ has been suggested [21].
This broader concept may generate a more accurate profile of
the ‘true’ waiting times for surgery.

In all groups, the patient-reported time to the day of operation
was longer than the patients’ time on waiting list as reported
by the hospital. In part, this is because patients were asked to
estimate the time from their first outpatient visit at the hospi-
tal to the time of the operation, whereas the patients’ waiting time
reported by the hospitals covered only the time on waiting list.
Firstly, these differences could be explained by the fact
that the patients are not always put on a waiting list at their
first outpatient visit, as further investigations may be neces-
sary. Secondly, patients may overestimate this period of time.
A third, perhaps less likely explanation, could involve admin-
istrative delays in placing patients on the waiting list.

In the present study, the only socio-economic factor with a
significant impact on waiting time was employment. Working
patients in the back surgery group tended to wait less
(assessed by both hospital and patient reports) than non-
working patients. In accordance with this, Clover [5] found
that employment influenced the waiting time for elective sur-
ery. Our results suggest that the effect of working status on
waiting time may be different for different procedures. Other
factors associated with the patients’ socio-economic back-
ground did not have major impact on the time that the ortho-
paedic patients waited at different phases in the care process.
These results support what has been concluded in other stud-
ies of patients waiting for various kinds of elective surgery
[3,4,7,11].

One important predictor of waiting time ought to be the
patients’ pre-operative health-related quality of life. However,
others [5,11,22,23] have shown that this correlation is weak
for orthopaedic patients, when using either a generic or a dis-
ease-specific health-related quality of life measure. We found
no association between the patients’ pre-operative EQ-5D
and waiting time in the hip replacement and back surgery
groups. Two possible explanations for this could be that the
patients actually do not receive care according to need or that
the generic health-related quality of life instrument EQ-5D is
an inappropriate measure for these groups of patients. There
was a significant correlation between the patients’ pre-operative
EQ-5D and each phase of waiting time in the arthroscopic
knee surgery group, indicating that this instrument may be
suitable for measuring health-related quality of life in this
specific group. It also shows that the patient’s view is in
accordance with the doctors’ clinical view of the priority of
the medical problem, i.e. evidence of clinical equity. For back
surgery and hip replacement patients, who are older on aver-
age and thus more likely to suffer from co-morbidities, a
disease-specific measure might be more in accordance with
the medical prioritization.

An important factor for time spent on a waiting list was hos-
pital type. In all groups, patients who received surgery at
county/district county hospitals had shorter times on the wait-
ing list than corresponding patients at university/regional hos-
pitals. One possible explanation for this could be that elective
surgery at university/regional hospitals is more frequently
delayed due to emergency cases. In our sample hip replace-
ments and back surgeries at university/regional hospitals were
more likely to be rescheduled (data not shown). It is not clear
whether this was due to trauma surgery or other circumstances,
initiated by the hospitals or by the patients themselves. A
separate analysis (data not shown) showed wide variations in
waiting times between the different county hospitals.

In accordance with results from other studies [9,11] the
length of waiting time greatly influences patient acceptability
of the wait. Interestingly, back surgery patients who had their
scheduled date for surgery changed were more likely to have a
negative attitude toward the time spent on the waiting list.
According to the patient survey, the majority of changes of
surgery date were initiated by the hospital (data not shown).
Arthroscopic patients who felt they had no influence in deciding
the date of surgery had a more negative view than others
about their time on the waiting list.

Our study has some limitations. Firstly, hospital-reported
and patient-reported waiting times might be uncertain in
some cases. Some hospitals were able to extract waiting time
data directly from the hospital computer system while others
had to find the dates of patient visits and manually calculate
the time on the waiting list. Regarding patient-reported wait-
ting times, concern has been raised about patient recall bias in
using self-reported surveys [7]. However, a study of knee
replacement patients compared patient-reported waiting time
with the medical record and found no systematic relationship
between the time that had elapsed since the operation and the
accuracy of a patient’s memory [24].

Another potential limitation concerns the modification of
EQ-5D, which limits comparability with other studies. How-
ever, the primary goal of our modification was to describe
and compare the patients’ health-related quality of life at two
different points in time, pre- and post-operatively, not to com-
pare the index itself with indexes calculated in other studies.
For validation, the patients’ EQ-5D indexes post-operatively
were compared with the answers to the question about the
patients’ self-rated health status post-operatively. The results
showed that the health-related quality of life consistently
decreased with lower self-rated health status. Therefore, we
concluded that the modified EQ-5D could be used to measure
the patients’ health-related quality of life.

The main contribution of the study is that we evaluated
three different phases of waiting time respecting length of
waiting and factors associated with waiting. The results indi-
cate that, irrespective of phase of waiting time, socio-econo-
mic factors and ‘previous wait’ do not to any large extent
explain variations in waiting time between the three patient
groups. However, working patients in the back surgery group
had significantly shorter waiting times than non-working
patients by all waiting time measures. A higher pre-operative
EQ-5D score was associated with a longer waiting time in the
arthroscopy group for the three waiting time periods studied,
but not in the hip replacement or back surgery groups. Pre-
dictors of waiting times may vary for different procedures. A
consistent and strong predictor of longer time on a waiting
list was admission to a university/regional hospital. We sug-
gest that from an equity and a prioritization perspective in the
management of waiting lists, attention should be focused on

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the role of hospital-related factors and the use of quality of life instruments.

The length of wait has significant importance for the patients’ view of waiting time. The possibility of influencing the date of surgery and changes in dates for surgery also appears to have some impact in this context. These findings contribute valuable information to those engaged in forming waiting time policies and managing waiting lists, e.g. policies on how to present waiting time information and ways to make patients less discontent with their wait.

Acknowledgements

The authors would like to thank the orthopaedic surgeons who served as a reference group during the study and who also contributed to the recruitment of patients.

References


