Equity in Canadian health care: Does socioeconomic status affect waiting times for elective surgery?

Samuel E.D. Shortt, Ralph A. Shaw

Abstract

Background: Waiting times for surgical and other procedures are an important measure of how well the health care system responds to patient needs. In a universal health care system such as Canada's, it is important to determine if waiting times vary by socioeconomic status (SES). We compared waiting times for elective surgery of patients living in low and high socioeconomic areas.

Methods: We reviewed the medical charts of all patients who underwent elective surgery at a Canadian academic health centre between 1992 and 1999. Using patient postal codes we assigned SES on the basis of 5 characteristics in the 1996 census data. We compared waiting times for surgery for people from regions in the lowest third (low SES group) with that for patients from regions in the upper third (high SES group).

Results: On average, patients in the high SES group waited 31.1 days and those in the low SES group waited 29.3 days. When differences in waiting times for 22 common procedures were examined between the groups, only the difference for prostatectomy was statistically significant: patients in the high SES group waited 4.4 fewer days than those in the low SES group.

Interpretation: We found little evidence that residing in a region in which SES was in the lowest third was associated with longer waiting times for elective surgery.

Methods

The 2 hospitals in the academic health centre in Kingston, Ont., provided elective surgery during the 7-year study period. The vast majority of surgical patients are drawn from 2 counties in which socioeconomic characteristics differ in minor respects from provincial norms: there are more unemployed males aged 15–24 years; there is a higher proportion of single mothers; and, although there is a smaller proportion of low-income households in the catchment area, both average and median incomes are lower than the provincial mean.

All elective inpatient and same-day surgeries done at the centre between July 1, 1992, and June 30, 1999, were identified from operating room records. The following information was collected from charts: the procedure type and date, the date the patient was added to the waiting list (taken from the consultant’s letter to the referring physician) and the patient’s postal code.

Catchment area: Between 1993 and 1996, the 2 hospitals provided 94% of hospital-based care received by residents of the city.
of Kingston and Frontenac County, and they provided 64% received by residents of the adjacent Lennox & Addington County. No other county in the region received more than 50% of its hospital care from Kingston, but local data and data from the Canadian Institute for Health Information indicate that the centre serves patients from across southeastern Ontario (Kingston General Hospital Strategic Information Development Unit: unpublished data [market share report, 1993–1996]).

Assigning SES: Because the SES of individuals was unknown, SES was assigned to patients on the basis of location of residence. Data were drawn from the 1996 census24 for the 2755 enumeration areas in the southeastern Ontario catchment area and correlated with the postal codes of 4678 patients using a postal code conversion file.21 Enumeration areas with a high proportion of rental accommodations, a high proportion of single-parent families, low household incomes, high unemployment rates among people over 15 years of age and low levels of postsecondary education were identified as being of low SES. Such grouped indicators have been used in other Canadian studies;12,13,26 this method minimizes the limitations that arise when a single measure such as income is used.27,28

In the event that a postal code crossed the boundary of an enumeration area, the “single-link indicator,” as assigned to the postal code in the postal code conversion file, was used to allocate the postal code to a specific enumeration area. On the rare occasion when the single-link indicator could not resolve the issue (in 100 cases), the postal code was examined and individually allocated an SES, on the basis of the attributes of the immediately surrounding enumeration areas.

In as much as census data are less accurate than individual data for assigning SES to individuals,29,30 devising small, precisely defined categories may be misleading. Instead, we chose to create a clear demarcation of 2 broad populations at the extremes of an SES continuum. Enumeration areas were considered to be below average (low SES) if they were at least 1 standard deviation below the catchment area average on 3 of the 5 indicators. Areas having a low prevalence of low-status indicators were considered to be above average (high SES). The low SES group consisted of 913 enumeration areas with a population of 519,746; the high SES group consisted of 930 enumeration areas with a population of 646,170. They were separated by an average group of roughly the same number and distribution.

Calculating waiting times: Waiting time data display a positively skewed distribution, and thus a direct calculation of the mean as a measure of central tendency is uninformative and analyses of variance (ANOVA) cannot be used to analyze such data. Therefore, the original distribution data were first normalized, using their natural logs (ln[x+1]). Because the natural log of zero (i.e., same-day surgery) is a mathematical impossibility, data were shifted up by 1 day to include those patients. Mean waiting times were estimated by calculating the mean of the transformed data (Σln[x+1]/n), turning this value back into a real number by calculating the exponent of the mean of the natural logs (exp[Σln[x+1]/n]-1), and then shifting down 1 to negate the earlier shift up. The resulting values were considered to represent the mean of the original data set. Natural logs of the waiting times were used in each ANOVA and the results were transformed into real numbers. Statistically significant differences in means were thus identified among regions of different SES.

Ethics review was conducted by the Queen’s University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board.

Results

Of the 53,378 surgeries performed during the study period, postal codes could be identified for 39,963. Patients whose postal codes were not recorded were more likely to have had surgery at one of the hospitals but were otherwise similar (waiting time, sex, date of procedure, surgical department) to those whose postal codes were known. Of those with postal codes identified, 875 were excluded because they came from outside the catchment area. Of the 39,090 that could be linked to SES data, 12,959 were in the high SES group, 11,048 were in the low SES group, and the balance were in the average SES group.

For all surgical procedures, the average time from being placed on the waiting list to surgery was 30.6 days. On average, the high SES group waited 31.1 days and the low SES group waited 29.3 days, a statistically significant difference of 6% (p < 0.001). When the data were analyzed by surgical department or division, only 2 statistically significant differences were found: for thoracic surgery, the high SES group waited 10.4 days and the low SES group waited 8.6 days (p = 0.032); for gynecological procedures, the waiting times were 19.6 and 15.8 days, respectively (p < 0.001).

Waiting times for 22 common elective procedures were examined. As shown in Table 1, there were only 2 procedures for which waiting time differed by SES. In the case of prostatectomy, patients in the high SES group waited 4.4 fewer days than those in the low SES group (p = 0.026). For tubal ligation, the high SES group waited 4.1 more days than the low SES group (p = 0.037). However, when the tubal ligation were examined more closely, the mean waiting time among patients undergoing this operation as a single procedure was 28.3 days, as compared with 11.0 days if it was an element of a multiple procedure. In neither of these cases was the difference in SES statistically significant.

Interpretation

We found no relation between socioeconomic status and waiting times for elective surgical procedures at an Ontario academic health centre. These results were stable over a 7-year period characterized by reduced health care spending and hospital restructuring. Our findings are consistent with the conclusions of a recent study of SES and use of physicians’ services in Ontario during a similar study period.16

It is important to acknowledge the limitations to our approach. First, we report some statistically significant differences in waiting times, but because they refer to elective procedures, they are not likely to be clinically significant. Second, although we use an ecological measure of SES rather than a direct assessment, we believe the literature supports this as a valid use of census data.16,17 Third, by focusing on receipt of service, our analysis excludes patients who did not follow through with surgery after being placed on the waiting list or who continued to wait beyond
the study period. We acknowledge that this approach introduces a bias into the calculation of waiting times that prospective data do not, but it should not influence the socioeconomic distribution of waiting times. Fourth, our data did not permit adjustment for severity of illness. It is possible that people of lower SES enter the health care system at a later stage in the disease process and should experience shorter waits than less severely ill people of higher SES. Finally, the interval between surgical consultation and receipt of surgery is only 1 element in the waiting experience that begins when a patient requests an appointment with his or her family physician. There is some evidence that patients from low SES areas may wait longer for diagnostic tests or initial contact with a surgeon, but subsequently the wait differentials disappear. Our data did not allow us to examine phases in the waiting experience.

Despite the fact that financial barriers do not overtly affect the receipt of health care in Canada, it is possible that SES influences access to service on a more subtle level. Two previous studies have found lower SES to be associated with longer waits for service in Ontario. However, our findings document that, during a period of widespread restructuring in Ontario hospitals, people from low SES areas did not wait longer than those from high SES areas for elective surgery. It has been suggested that a valuable approach to monitoring the impact of the health reforms is to track trends in service delivery to society’s most vulnerable groups. Our results suggest, as do those from Manitoba, that efficiency does not appear to have been purchased at the price of equity.

This article has been peer reviewed.

Dr. Shortt is the Director of and Mr. Shaw is a Research Associate with the Centre for Health Services and Policy Research, Faculty of Health Sciences, Queen’s University, Kingston, Ont.

Competing interests: None declared.

Contributors: Dr. Shortt was responsible for study conception, interpretation of findings and for writing the paper. Mr. Shaw was responsible for data linkage and statistical analysis. Both authors collaborated on the methodology and approved of the final version of the manuscript.

Acknowledgments: Analysis and data linkage for this study was supported by a grant from the National Health Research and Development Program at Health Canada. Data retrieval was made possible by a grant from the Physicians’ Services

Table 1: Mean waiting times for elective surgery by procedure and socioeconomic status (SES)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>No. of patients</th>
<th>Mean wait, d</th>
<th>High SES v. low SES</th>
<th>Difference</th>
<th>% difference</th>
<th>p value</th>
<th>Longer wait?</th>
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</thead>
<tbody>
<tr>
<td>Arthroscopy, knee</td>
<td>1148</td>
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<td>50.9</td>
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<td>0.6</td>
<td>0.93</td>
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<td>Arthroplasty, hip</td>
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<td>21.6</td>
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<td>0.16</td>
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<td>Breast biopsy</td>
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<td>0.0</td>
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<td>Cataract removal</td>
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<td>48.8</td>
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<td>0.12</td>
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<td>Coronary artery bypass grafting</td>
<td>929</td>
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<td>0.43</td>
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<td>14.1</td>
<td>0.9</td>
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<td>Dental extractions</td>
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<td>Dilatation and curettage</td>
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<td>Disc surgery (neurosurgery)</td>
<td>262</td>
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<td>11.9</td>
<td>0.66</td>
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</tr>
<tr>
<td>Disc surgery (orthopedic surgery)</td>
<td>162</td>
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<td>6.5</td>
<td>19.4</td>
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<td>5.0</td>
<td>0.54</td>
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<tr>
<td>Hysterectomy</td>
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<td></td>
<td>30.4</td>
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<td>Laparoscopic cholecystectomy</td>
<td>996</td>
<td></td>
<td>28.8</td>
<td>3.5</td>
<td>11.6</td>
<td>0.18</td>
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<td>Laparoscopy (general surgery)</td>
<td>640</td>
<td></td>
<td>27.3</td>
<td>1.8</td>
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<td>Laparoscopy (gynecology)</td>
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<td>Mammoplasty</td>
<td>561</td>
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<td>9.4</td>
<td>8.1</td>
<td>0.34</td>
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<tr>
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<td></td>
<td>13.8</td>
<td>2.1</td>
<td>13.8</td>
<td>0.33</td>
<td>No</td>
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<tr>
<td>Mastectomy, radical</td>
<td>153</td>
<td></td>
<td>13.1</td>
<td>1.6</td>
<td>11.9</td>
<td>0.47</td>
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<tr>
<td>Myringotomy and tubes</td>
<td>915</td>
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<td>4.3</td>
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<td>16.9</td>
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<td>0.026</td>
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<td>Septorhinoplasty</td>
<td>408</td>
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<td>0.99</td>
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<tr>
<td>Tonsillectomy and adenoidectomy</td>
<td>1148</td>
<td></td>
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<td>1.2</td>
<td>3.3</td>
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<tr>
<td>Tubal ligation</td>
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<td>28.3</td>
<td>3.7</td>
<td>12.5</td>
<td>0.14</td>
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<tr>
<td>As part of multiple procedures</td>
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<td></td>
<td>11.0</td>
<td>3.3</td>
<td>24.2</td>
<td>0.15</td>
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<tr>
<td>All tubal ligations</td>
<td>1080</td>
<td></td>
<td>22.3</td>
<td>4.1</td>
<td>16.9</td>
<td>0.037</td>
<td>Yes (high SES)</td>
</tr>
</tbody>
</table>

This article has been peer reviewed.
References


Correspondence to: Dr. Samuel E.D. Shortt, Director, Centre for Health Services and Policy Research, Faculty of Health Sciences, Queen’s University, Kingston ON K7L 3N6; fax 613 533-5363; seds@post.queensu.ca