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NHS waiting lists and evidence of national or local failure: analysis of health service data

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Abstract

Objectives To investigate the national distribution of prolonged waiting for elective day case and inpatient surgery, and to examine associations of prolonged waiting with markers of NHS capacity, activity in the independent sector, and need.
Setting NHS hospital trusts in England.
Population People waiting for elective treatment in the specialties of general surgery; ear, nose and throat surgery; ophthalmic surgery; and trauma and orthopaedic surgery.
Main outcome measure Numbers of people waiting six months or longer (prolonged waiting). Characteristics of trusts with large numbers waiting six months or longer were examined by using logistic regression.
Results The distribution of numbers of people waiting for day case or elective surgery in all the specialties examined was highly positively skewed. Between 52% and 83% of patients waiting longer than six months in the specialties studied were found in one quarter of trusts, which in turn contributed 23-45% of the national throughput specific to the specialty. In general, there was little evidence to show that capacity (measured by numbers of operating theatres, dedicated day case theatres, available beds, and bed occupancy rate) or independent sector activity were associated with prolonged waiting, although exceptions were noted for individual specialties. There was consistent evidence showing an increase in prolonged waiting, with increased numbers of anaesthetists across all specialties and with increased bed occupancy rates for ear, nose, and throat surgery. Markers of greater need for health care, such as deprivation score and rate of limiting long term illness, were inversely associated with prolonged waiting.
Conclusion In most instances, substantial numbers of patients waiting unacceptably long periods for elective surgery were limited to a small number of hospitals. Little and inconsistent support was found for associations of prolonged waiting with markers of capacity, independent sector activity, or need in the surgical specialties examined.

Introduction

Waiting lists have a central place in the experience and perception of health care in the NHS in the United Kingdom, although they are also a feature of publicly funded health systems in other countries.[1–7] The phenomenon of waiting lists has changed little over the 50 year history of the NHS despite the high political profile of attempts to ameliorate it.[8] Long waiting lists are clearly a form of rationing and may imply that rationing is a necessary response to an overall disparity between demand and supply in a publicly funded health system that is free at the point of access. It may be misleading to interpret specific failures in health care in terms of economists' conventional assumption of a global mismatch between demand and supply.[9] In specific areas of failed supply, particularly total hip replacement and cataract extraction, it seems that empirically measured potential demand is within the capacity of the NHS.[10 11]

In this study we are interested in unacceptable waiting rather than legitimate scheduling. We examined the distribution of patients who are subjected to long periods of waiting for elective surgical inpatient and day case treatment—firstly, to determine whether this is a generalised expression of demand exceeding supply and, secondly, to seek explanations for the patterns that emerge in terms of capacity in the NHS, activity in the independent sector, characteristics of trusts, and need for health care (see box).

Methods

The waiting list data are for England during the quarter ending December 1999 (KH07 quarterly returns, Department of Health). The waiting time for each patient for day case or inpatient elective surgery in the specialties of general surgery; ear, nose, and throat surgery; ophthalmic surgery; and trauma and orthopaedic surgery, was classified as less than six months or six months and longer, on the basis that waiting six months or longer for surgery represents an unacceptable denial of access to treatment. A maximum wait of six months is a target (by end 2005) performance indicator in the NHS Plan.[12]

We used routine data obtained from the Department of Health, the Office for National Statistics, and the internet (for details see bmj.com).

Descriptive analysis

Firstly, we charted the specialty specific distribution of the numbers of people in each trust waiting six months or longer. Secondly, we computed the contribution made by trusts forming the upper fourth of numbers of patients whose waits were prolonged to the total numbers waiting six months or longer. Thirdly, we expressed the number of patients waiting six months or longer as a percentage of the national throughput for day case and inpatient surgery in each specialty (measured by total number of finished consultant episodes). Fourthly, we mapped the geographical distribution of trusts with the most patients with prolonged waits (top 25% of the distribution) in 1999 in relation to all other trusts.

Statistical analysis

To examine associations between individual variables reflecting capacity, independent sector activity, need, and characteristics of trusts we used correlation coeffi-

cients. To investigate the characteristics of those hospital trusts with the highest numbers of patients whose waits were prolonged, we used logistic regression to compare trusts forming the upper fourth of numbers of patients whose waits were prolonged with the lower three fourths. Explanatory variables were grouped into thirds so that estimated odds ratios are per third increase in each variable. See bmj.com for a detailed modelling strategy.

Factors considered as contributing to prolonged waiting and included in explanatory models

- Throughput: Speciality specific number of finished consultant episodes per year
- Capacity: Numbers of consultants and anaesthetists per 100 beds and of operating theatres, average daily numbers of available beds, bed occupancy rate
- Intensity of activity in independent sector (per health authority): Numbers of private hospitals and clinics and of beds in private hospitals and clinics
- Population size of the trust's health authority
- Need (per health authority): Rate of long term limiting illness, proportion of the population >65, Jarman score, standardised mortality ratio
- Characteristics of trusts: Teaching hospital status, performance rating

Results

Distribution of waiting

In most instances substantial numbers of patients waiting longer than six months are restricted to a relatively small proportion of trusts (fig 1). The absolute numbers of people waiting longer than six months were strongly correlated with rates of waiting longer than six months per specialty specific finished consultant episode (Spearman's rank correlation coefficients 0.83-0.94).

Altogether 718 284 patients were waiting for day case or inpatient elective surgery in England during the quarter ending December 1999 (table 1). For day cases, 18-28% of patients had waited longer than six months (prolonged waits). The corresponding figures for inpatient surgery were 29-40%. Specialties vary in the extent to which patients with prolonged waits represent a substantial proportion of their throughput; in most specialties the numbers waiting prolonged periods are small in relation to national throughput (3-16%). Between 52% and 83% of patients with prolonged waits were found in 25% of trusts (trusts in the upper fourth of the distribution of patients with prolonged waits) who contributed to 23-45% of national throughput (table 1).

Trusts with the most (top 25% of the distribution) patients with prolonged waits in 1999 were generally clustered along the south coast, in London, and in the north west (fig 2 and bmj.com).

Correlation matrices

Numbers of patients waiting longer than six months for inpatient elective general surgery were moderately correlated with numbers of finished consultant episodes (r=0.44), daily available beds (r=0.44), anaesthetists per 100 beds (r=0.38), operating theatres (r=0.49), and dedicated day case theatres (r=0.28). Correlations between prolonged waiting and both independent activity and need were weak (see bmj.com).

Characteristics of trusts forming the upper fourth

Trusts with the most patients with prolonged waits had more available beds and, for some specialties, a higher bed occupancy rate (table 2). In multivariable models, the odds of a trust being in the upper fourth of the distribution of patients with prolonged waits increased by 49-110% per third of total bed availability across specialties, and by 42-69% per third of bed occupancy for ear, nose, and throat surgery and trauma or orthopaedic surgery. Trusts in the upper fourth also tended to have a higher number of anaesthetists. Trusts with the most patients with prolonged waits for general surgery had higher private sector activity in their health authority and more surgeons for trauma and orthopaedic surgery than other trusts. In general, markers of greater need for health care, such as Jarman score, were inversely associated with prolonged waiting. There was some evidence that trusts with the most patients whose waits for inpatient general surgery were prolonged were more likely to be teaching hospi-

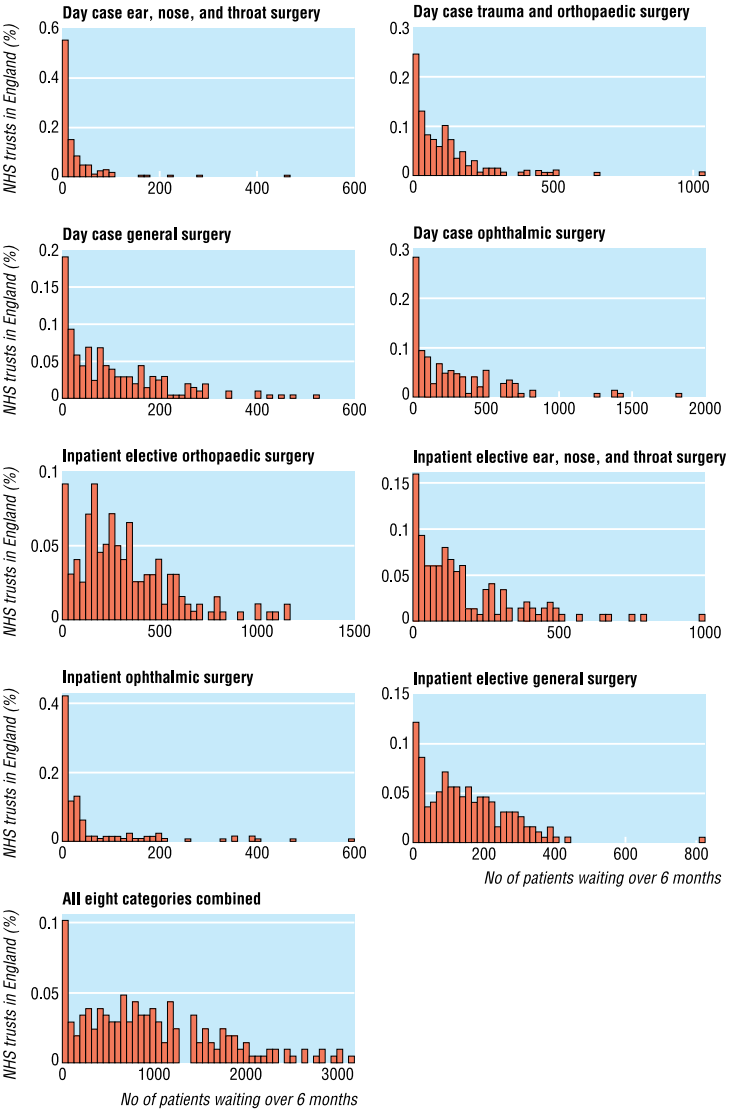

Fig 1 Distribution of patients waiting longer than six months in NHS trusts in England, December 1999

Table 1 Specialty specific distribution of numbers of patients waiting for elective surgery in England, 1 October-31 December 1999

Specialty	No of trusts	Total No waiting	Total No (%) waiting ≥6 months	Overall national throughput*	Patients waiting ≥6 months as % of national throughput*	% contribution of upper fourth of trusts to: Total No waiting ≥6 months in England†	% contribution of upper fourth of trusts to: National throughput
General surgery:							
Day cases	204	109 818	20 813 (19)	445 705	5	60	30
Inpatients	197	99 147	28 609 (29)	925 412	3	52	32
Trauma and orthopaedic surgery:							
Day cases	207	88 344	22 562 (26)	181 684	12	63	29
Inpatients	197	154 835	61 399 (40)	588 623	10	52	36
Ear, nose, and throat surgery:							
Day cases	165	23 566	4 356 (18)	110 940	4	80	23
Inpatients	150	79 274	25 525 (32)	249 758	10	63	31
Ophthalmic surgery:							
Day cases	149	138 659	39 174 (28)	238 153	16	67	42
Inpatients	128	24 641	8 121 (33)	119 528	7	83	45

*Throughput (number of finished consultant episodes) includes non-waiting list patients.
†% contributed by hospital trusts forming the upper quarter of numbers of patients with prolonged waits to the total numbers waiting >6 months in England.

tals, but the pattern was not consistent across specialties and the directions of the effect estimates were reversed for ear, nose, and throat surgery and ophthalmic surgery in multivariable models. Three star rating was inversely associated with prolonged waiting.

Prolonged waiting for day case ear, nose, and throat surgery was associated with higher rates of bed occupancy and numbers of anaesthetists (see bmj.com). Trusts with the most patients with prolonged waits for day case ophthalmic surgery had more private premises, a higher standardised mortality ratio, and a higher proportion of the population over 65 at health authority level, but an inverse association with the rate of limiting long term illness. Trusts with the most patients whose waiting for day case surgery was prolonged were less likely to be teaching hospitals.

The characteristics of the highest tenth of trusts for numbers of patients with prolonged waits were generally similar to those in the top fourth.

In trusts providing all four specialties, correlations between specialties in rates of prolonged waiting for inpatient elective surgery ranged from −0.01 (ear, nose, and throat surgery, ophthalmic surgery) to 0.52 (general, and trauma and orthopaedic surgery) and for day case surgery they ranged from 0.05 (ear, nose, and throat surgery, ophthalmic surgery) to 0.36 (general and trauma and orthopaedic surgery). All but one of the correlations for inpatient admissions were ≥0.20, and for day case admissions all but one of the correlations were >0.15.

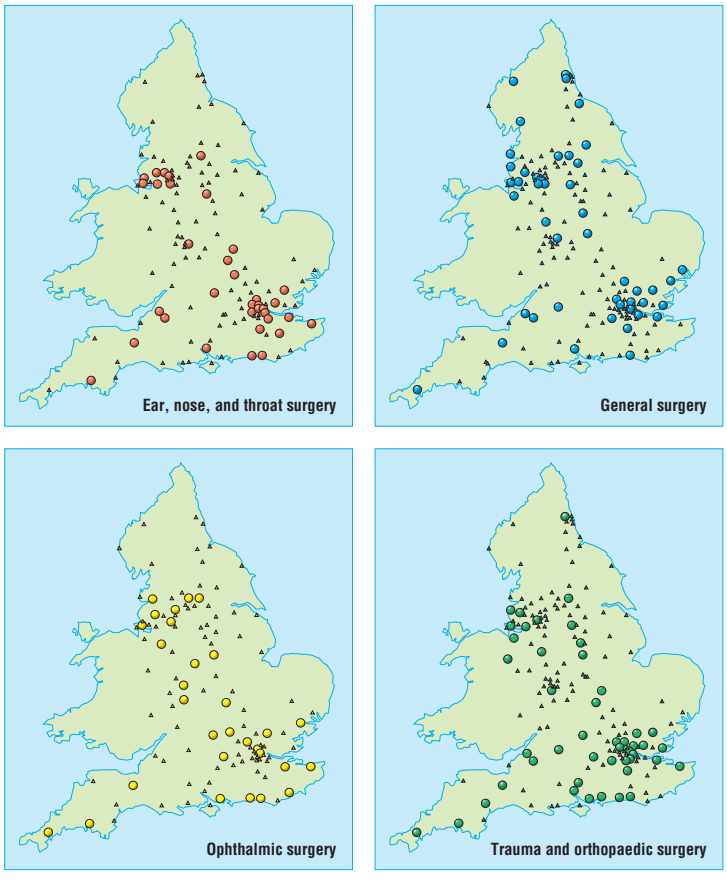

Fig 2 Geographical distribution of trusts with the most (top 25% of the distribution) patients with prolonged waits in relation to all other trusts: England, 1999—inpatient elective surgery

Discussion

Despite widespread political and media attention little empirical evidence exists on the distribution of waiting and prolonged waiting in England. In most instances substantial numbers of patients waiting longer than six months in the main surgical specialties are restricted to a relatively small proportion of hospitals.

We found little and inconsistent evidence that capacity—as measured by numbers of operating theatres, dedicated day case theatres, available beds, or bed occupancy rate—is associated with prolonged waiting. In line with previous research we found that trusts with more consultant surgeons and anaesthetists had more patients whose waits were prolonged.[13] The supply of doctors can induce demand,[14 15] but further work is required to determine if this is the explanation for the observed association. Numbers of anaesthetists, for example, could be a marker for some other relevant characteristic such as the complexity of work undertaken.

We found little evidence that activity in the independent sector influenced prolonged waiting, apart from a positive association of private premises with prolonged waiting for day case ophthalmic

surgery, in line with data on waiting for cataract surgery in Canada.[1]

In general, trusts in health authorities with higher potential need had fewer patients with prolonged waits. Possible explanations include uncontrolled confounding factors, such as referral rates from general practitioners. Secondly, observed inverse associations of prolonged waiting with markers of increased need may reflect inequalities in access to elective surgery in deprived populations (for reasons other than general practitioners' referral rates).[16] Thirdly, the findings could indicate NHS success in targeting resources towards where they are needed most. In support of this possibility, we found some evidence of a positive relation between need and capacity (such as positive correlations of Jarman score, standardised mortality ratio, and rate of long term limiting illness with numbers of available beds and operating theatres; see table A on bmj.com), although this evidence was inconsistent (for example, correlations with numbers of anaesthetists and general surgeons were negative). Finally, our data do not rule out the possibility that in affluent areas with more patients

Table 2 Logistic regression analysis showing associations between hospital trusts forming the upper quarter of numbers of patients with prolonged waits for inpatient elective surgery, with hospital capacity, private provision, and markers of population ill health, by specialty. Values are odds ratios (95% confidence intervals, P values)

	General surgery	Ear, nose, and throat surgery	Ophthalmic surgery	Trauma or orthopaedic surgery
NHS capacity				
No of operating theatres:				
Simple model	1.64 (0.93 to 2.86, P=0.085)	1.39 (0.80 to 2.42, P=0.24)	1.03 (0.57 to 1.86, P=0.92)	1.25 (0.73 to 2.15, P=0.41)
Adjusted model	0.99 (0.47 to 2.07, P=0.97)	1.04 (0.49 to 2.21, P=0.92)	0.62 (0.25 to 1.56, P=0.31)	0.86 (0.38 to 1.92, P=0.71)
No of dedicated day case theatres:				
Simple model	1.28 (0.85 to 1.91, P=0.23)	1.22 (0.77 to 1.93, P=0.39)	1.04 (0.58 to 1.85, P=0.90)	1.07 (0.70 to 1.64, P=0.74)
Adjusted model	1.04 (0.66 to 1.64, P=0.88)	1.10 (0.64 to 1.88, P=0.74)	1.01 (0.51 to 1.99, P=0.98)	1.08 (0.64 to 1.83, P=0.78)
Average daily No of available beds:				
Simple model	1.56 (0.93 to 2.60, P=0.092)	1.30 (0.76 to 2.24, P=0.34)	1.24 (0.69 to 2.22, P=0.47)	1.12 (0.66 to 1.89, P=0.68)
Adjusted model	1.49 (0.83 to 2.64, P=0.18)	1.57 (0.85 to 2.90, P=0.15)	2.10 (1.00 to 4.39, P=0.05)	2.04 (1.01 to 4.11, P=0.046)
Bed occupancy rate (%):				
Simple model	1.11 (0.72 to 1.72, P=0.64)	1.65 (1.00 to 2.73, P=0.05)	0.96 (0.56 to 1.64, P=0.88)	1.39 (0.86 to 2.24, P=0.18)
Adjusted model	1.15 (0.72 to 1.83, P=0.57)	1.69 (0.98 to 2.92, P=0.058)	0.96 (0.54 to 1.70, P=0.88)	1.42 (0.84 to 2.41, P=0.19)
No of anaesthetists per 100 beds:				
Simple model	1.75 (1.11 to 2.74, P=0.015)	1.47 (0.90 to 2.41, P=0.13)	1.47 (0.85 to 2.52, P=0.17)	1.79 (1.10 to 2.90, P=0.019)
Adjusted model	1.76 (1.05 to 2.95, P=0.033)	1.39 (0.80 to 2.42, P=0.25)	1.45 (0.80 to 2.63, P=0.22)	1.44 (0.83 to 2.49, P=0.20)
Specialty specific No of surgeons per 100 beds:				
Simple model	1.15 (0.74 to 1.78, P=0.54)	1.07 (0.65 to 1.75, P=0.78)	1.53 (0.85 to 2.75, P=0.16)	1.84 (1.12 to 3.03, P=0.016)
Adjusted model	1.02 (0.60 to 1.72, P=0.95)	0.99 (0.57 to 1.73, P=0.97)	1.89 (0.92 to 3.88, P=0.081)	1.93 (1.01 to 3.70, P=0.047)
Independent sector activity				
No of private hospitals and clinics:				
Simple model	1.32 (0.77 to 2.27, P=0.31)	1.31 (0.75 to 2.28, P=0.35)	1.11 (0.55 to 2.23, P=0.78)	1.32 (0.71 to 2.48, P=0.38)
Adjusted model	1.13 (0.64 to 2.00, P=0.67)	1.16 (0.64 to 2.11, P=0.62)	1.07 (0.51 to 2.24, P=0.85)	1.09 (0.56 to 2.14, P=0.79)
No of beds in private hospitals and clinics:				
Simple model	1.74 (0.99 to 3.05, P=0.054)	1.43 (0.79 to 2.57, P=0.23)	1.08 (0.54 to 2.16, P=0.82)	1.56 (0.86 to 2.83, P=0.14)
Adjusted model	2.00 (1.00 to 4.01, P=0.051)	1.06 (0.51 to 2.19, P=0.87)	1.08 (0.47 to 2.49, P=0.86)	1.31 (0.62 to 2.79), P=0.48)
Markers of healthcare need				
Proportion of population aged >65:				
Simple model	1.13 (0.74 to 1.73, P=0.57)	0.80 (0.50 to 1.30, P=0.37)	0.74 (0.43 to 1.25, P=0.26)	0.92 (0.59 to 1.44, P=0.72)
Adjusted model	1.07 (0.63 to 1.82, P=0.80)	0.78 (0.43 to 1.40, P=0.41)	0.59 (0.29 to 1.18, P=0.13)	0.93 (0.53 to 1.64, P=0.80)
Jarman score:				
Simple model	1.18 (0.76 to 1.85, P=0.45)	0.87 (0.52 to 1.46, P=0.61)	0.92 (0.52 to 1.62, P=0.77)	0.87 (0.54 to 1.40, P=0.55)
Adjusted model	1.07 (0.60 to 1.92, P=0.81)	0.83 (0.43 to 1.58, P=0.57)	0.57 (0.27 to 1.24, P=0.16)	0.92 (0.48 to 1.76, P=0.79)
Standardised mortality ratio:				
Simple model	0.93 (0.58 to 1.47, P=0.74)	0.72 (0.42 to 1.23, P=0.23)	0.95 (0.54 to 1.70, P=0.87)	0.69 (0.43 to 1.11, P=0.13)
Adjusted model	0.79 (0.36 to 1.76, P=0.57)	0.93 (0.38 to 2.24, P=0.87)	0.68 (0.25 to 1.86, P=0.45)	1.06 (0.46 to 2.46, P=0.89)
Rate of limiting long term illness (%):				
Simple model	1.05 (0.64 to 1.71, P=0.86)	0.57 (0.32 to 1.01, P=0.055)	0.87 (0.46 to 1.65, P=0.67)	0.56 (0.34 to 0.93, P=0.024)
Adjusted model	1.30 (0.56 to 3.01, P=0.54)	0.68 (0.27 to 1.73, P=0.41)	1.66 (0.56 to 4.91, P=0.36)	0.61 (0.26 to 1.43, P=0.25)
Other trust characteristics				
Acute teaching trust status*:				
Simple model	3.84 (1.51 to 9.76, P=0.005)	1.63 (0.59 to 4.47, P=0.35)	1.42 (0.45 to 4.47, P=0.55)	2.35 (0.77 to 7.13, P=0.13)
Adjusted model	2.52 (0.67 to 9.51, P=0.17)	0.72 (0.16 to 3.19, P=0.67)	0.47 (0.09 to 2.59, P=0.39)	1.43 (0.33 to 6.19, P=0.63)
Three star status†:				
Simple model	0.75 (0.29 to 1.98, P=0.56)	0.45 (0.14 to 1.46, P=0.19)	0.64 (0.19 to 2.16, P=0.48)	0.49 (0.18 to 1.38, P=0.18)
Adjusted model	0.78 (0.28 to 2.20, P=0.64)	0.56 (0.16 to 1.93, P=0.36)	0.75 (0.20 to 2.79, P=0.67)	0.51 (0.16 to 1.57, P=0.24)

Effect size is odds ratio (upper quarter of trusts *v* lower three quarters) per unit increase in third of each explanatory variable.
Simple model controls for population denominator and total number of finished consultant episodes only. Adjusted model also controls for number of available beds, number of anaesthetists, number of specialty specific surgeons, number of private beds, proportion of people aged >65 years, Jarman score, standardised mortality ratio, rate of limiting long term illness.
*Odds ratios >1 indicate a positive association between being an acute teaching hospital and prolonged waiting, and an odds ratio <1 indicates an inverse association.
†Odds ratios >1 indicate a positive association between being rated three stars and prolonged waiting, and an odds ratio <1 indicates an inverse association.

What is already known about this topic

Many patients wait unacceptably long times for NHS surgery

The size of waiting lists is of little relevance to understanding access to treatment

Evidence is scant for the common assumption that the waiting problem arises from a global mismatch between supply and demand, and can be solved either by greater rationing or by increasing NHS capacity

What this study adds

Long waiting lists are not an indication of a general failure of the NHS

One quarter of hospital trusts contribute between half and four fifths of the patients waiting six months or longer

Measures of capacity (such as beds, operating theatres, doctors) and independent sector activity are not generally associated with prolonged waiting

with prolonged waits, patients who are waiting unacceptably long periods are socioeconomically deprived, a finding that would be in line with that of a study on waiting times for bypass surgery.[17]

Implications

This study challenges the widely held assumption that most patients in England are being forced to wait unacceptably long periods of time for elective surgery. This experience may be true for a minority of hospitals, but little evidence supports the notion that the waiting list phenomenon in most hospitals in England arises from an overall mismatch between supply and demand.

Public health specialists classically focus on population based strategies, with the aim of producing favourable shifts in the distribution of risk factors in the entire population.[18] Since the distribution of prolonged waiting in hospital trusts is highly positively skewed, this study shows that targeting all trusts is not warranted. Instead a "high risk" strategy is required, focusing measures on the minority of trusts where the waiting list problem is concentrated.

Few studies have examined determinants of prolonged waiting. At an individual level, employment, relative affluence, and higher urgency rating[4 19] are associated with less waiting. We have shown that prolonged waiting is not simply related to capacity, implying that many other factors are involved and raising questions about the appropriate policy interventions. Other countries are exploring the use of priority scores to manage waiting lists.[20] Clinicians' ratings of appropriateness based on capacity to benefit from surgery have been associated with clinical outcome[19] and offer an evidence based, transparent approach to demand management. Such strategies may be a better means than government waiting list targets of reducing inequalities in access to elective surgery.

Waiting lists are a national problem in that they have distorted health policy since the inception of the NHS. They are, however, better seen as a composite of local problems that cannot necessarily be attributed to any obvious disparity between supply and demand. To explain the supply problems surrounding the major waiting list conditions is difficult. For example, rates of total hip replacement are higher in the United Kingdom than the United States, and demand for cataract extraction is well within the current capacity of ophthalmic services.[9] The long term underinvestment in British health care is being tackled, but the waiting list problem cannot be expected to be solved by global investment alone.

Contributors: see bmj.com.
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Endpiece

Man's chief occupation

The most common of all follies is to believe passionately in the palpably not true. It is the chief occupation of mankind.

H L Mencken,
American editor, author, and critic, 1880-1951