Trends in waiting time to date and total time waited: are the sources compatible?

Sheila Dixon,
Department of Health

Department of Health Waiting List returns routinely measure the number of patients waiting for elective NHS admitted patient care on a given day, grouped by how long they have been waiting to date. The trend in the average waiting time estimated from this distribution is different from the trend in the average total time waited by patients admitted over a period of time, calculated from Hospital Episodes Statistics. This article investigates whether the results from the two sources are consistent.

Introduction

The official Department of Health measurement of waiting time is taken from the Waiting List returns. For admitted patient care (ordinary admissions and day cases), waiting lists are reported by specialty and by the length of time the patient has been waiting at the return date. As well as reporting the total waiting list size and the proportions waiting over certain numbers of months, these data are used to calculate an average waiting time.[1]

Objectives for waiting lists and times were set out in the National Priorities Guidance for 1999–2000 to 2001–2002.[2] As well as a reduction in the overall size of the waiting list, these sought a decrease in the average waiting time and the delivery of an 18-month maximum waiting time guarantee. This latter target has subsequently been reduced, first to 15 months then 12 months and less, in an ongoing drive to reduce waiting times. The waiting statistics show that the average waiting time has fallen most years since 1998.[3]

Information on the time waited for any specific operation or condition is only available nationally from the Hospital Episodes Statistics data warehouse (HES). The HES record-level dataset covers each episode of admitted patient care, including information on diagnoses and operative procedures as well as specialty, key dates and many other data items.[4] For elective admissions, the difference between the date that the patient was referred for treatment and the admission date provides a measure of total time waited by the patient. The HES average time waited by admitted patients over a year has risen most years since 1998.

At first sight it seems contradictory that the average official waiting time is falling whilst the average HES time waited is rising in recent years.

This article seeks to address whether the two sources are both compatible with an underlying change in patient waiting experience, or whether there are factors affecting the validity of one or other source.

Background

The official average waiting time is calculated as the median of the distribution of the length of time that patients have been waiting so far, at a point in time. While this only represents part of the waiting experience, it is biassed towards longer spells (since they are more likely to overlap the point in time) and these factors can be offsetting. The data relate to waiting list and booked admissions, ie those waiting to hear when their treatment can be scheduled and those who have been given a date already. Until 2002, the waiting time was typically reported in three-month-wide bands.

HES measures how long patients waited in total before admission (in days). HES is continuous, incorporating all admissions over an April to March year, and does not include any information on patients who were waiting but not admitted, eg due to cancellation, failure to attend or because they are still waiting. The period of time it measures, as well as being a total time waited, is not adjusted for self-deferrals or periods of medical/social suspension.

The two sources therefore measure different aspects of waiting: the official waiting statistics reflect a point in time wait to date and the HES figures are based on total wait of a flow of patients admitted for treatment. It is of interest to demonstrate the relationship between the point in time and flow measures.

Restricting HES to those waiting at a point in time

In order to compare the two series, HES may be restricted to a point in time. That point in time could be an admission date, showing how long different patients waited before admission on that day. But it would be more comparable to instead take the cohort of patients waiting on a certain date and look at their time waited up to that day, then to follow through with how their total time waited compared. The use of 31 March as such a reference date has various advantages, since it is immediately prior to the HES year and compares with the official waiting times statistics. However, waiting might have seasonal variation and be lower on the reporting dates at which targets are measured, so the comparison may differ slightly at other times. Note, though, that HES remains unadjusted for periods of suspension from the waiting list.

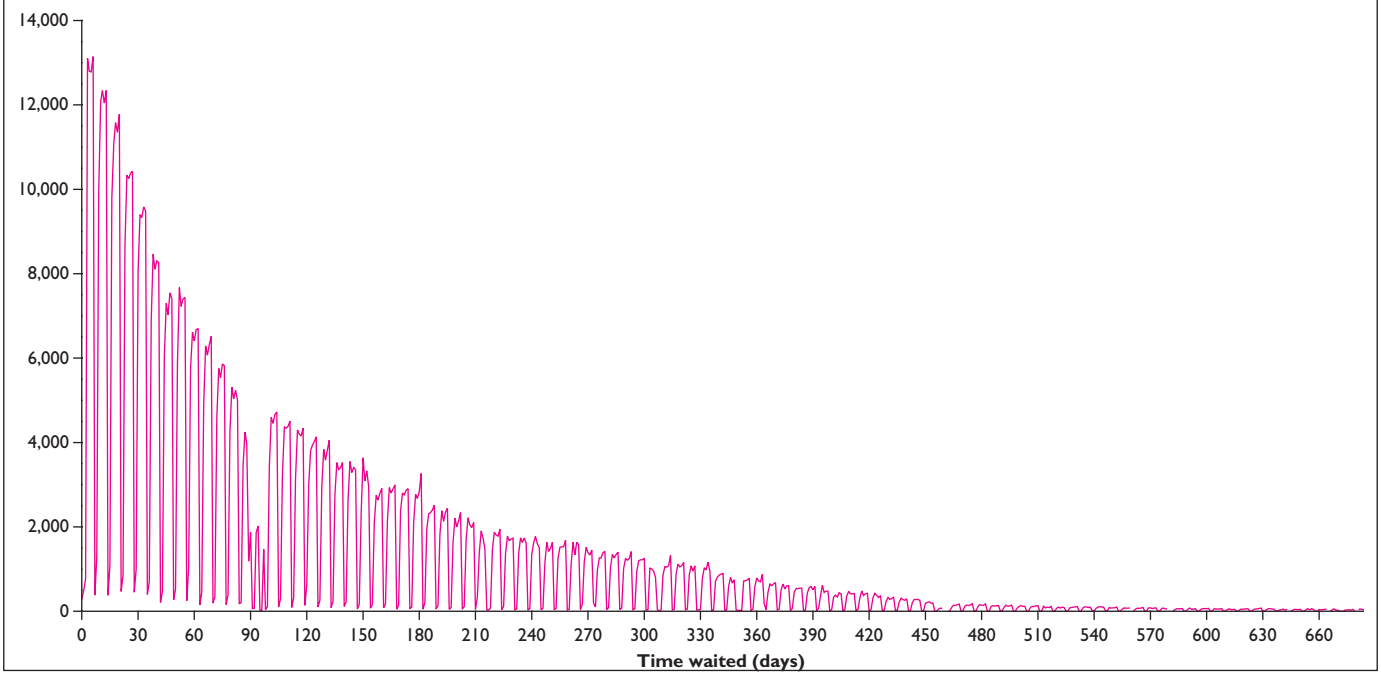
Patients waiting on 31 March 2002 were identified in HES if they were subsequently admitted in the year to March 2003 (which was the extent of the available data). Some waiting patients would be omitted because they were not admitted within the following 12 months and others would be omitted because they were taken off the list without admission. The analysis excludes patients for whom no elective date of referral was known. In addition, a filter was applied to exclude any patient who appeared to have been referred more than four years beforehand (ie had already been waiting at least four years), since these outliers may be invalid or else suspended for long periods from the waiting list. Apart from these omissions, this represents a complete cohort of patients waiting on 31 March. There were 950,000 such patients in HES on 31 March 2002.

Figure 1 shows a distribution of the lengths of time that this cohort of patients had been waiting so far up until 31 March 2002. The saw-tooth effect reflects low referrals at weekends. The dip around 90 days reflects the lower numbers of referrals occurring over the Christmas period. There is a smaller but discernible ghost of this around 460 days, for the previous Christmas.

HES median compared with official median waiting time

The mean of the distribution in Figure 1 (with its tail up to 4 years, not shown in the figure) is 123 days, with a median of 76 days. This compares with a median of 2.92 months (approximately 89 days) for the official median waiting time at end-March 2002. This difference seems quite large and the relationship differs from what might be expected given that HES waits are not adjusted for periods of suspension. The

Figure 1 **Distribution of HES time waited on 31 March 2002 for waiting/booked cases subsequently admited in 2002–2003: In-year admissions**



figures are slightly closer for the previous year: the HES mean wait to date for patients waiting on 31 March 2001 was 125 days with a median of 79 days, compared with a median of 2.90 months (approximately 88 days) for the official waiting times.

This raises the question of what differences exist between this HES distribution and the official waiting time statistics, that might be contributing to the nine-day (for 31 March 2001) difference in the medians:

a) HES excludes patients waiting on 31 March who are not admitted in the following 12 months (since waiters were identified by working backwards from admissions).
b) HES excludes patients waiting on 31 March who were not admitted at all, but taken off the list before admission.
c) HES measures times waited inclusive of any periods of suspension from the list.
d) HES includes patients suspended from the waiting list on 31 March.
e) HES waits exclude elective admissions with unknown time waited (eg missing or invalid referral date).
f) Official waiting times are not measured in days, as above, but in broader waiting bands.

The possible impact of these factors is discussed in Box 1. In summary, factor f) explains most of the difference observed between the HES and official waiting time medians, with factors b) and e) possibly also contributing, although with factors c) and d) working against them.

HES trend compared with official median waiting time

Although there is a difference between the levels of the official median waiting time and the HES median time waited to date, for those waiting on 31 March, the trends indicated by the two series are similar. The graph

Box one

Factors that might explain the observed difference between HES median time waited to 31 March 2001 (79 days) and official waiting time (88 days)

a) HES excludes patients who are not admitted in the following 12 months
Some patients waiting at 31 March 2001 may only recently have been added to the list and, if they were not admitted until after 12 months, they will not appear in HES until the 2002–2003 data year. Analysis of HES shows an extra five per cent of the number of cases admitted in 2001–2002 were admitted in 2002–2003. However, incorporating these extra waiters made no difference to the HES median wait to date up to 31 March 2001, which remained at 79 days. This factor therefore does not explain the discrepancy.

b) HES excludes patients who are not admitted at all
Some patients waiting at 31 March 2001 may be removed from the waiting list if their circumstances change, of which some may be put back on with a re-started clock,. If this group of patients tend to be waiting above the median waiting time, their inclusion could increase the median observed. A wait longer than the median seems reasonable: Trusts may only review whether it is appropriate to remove patients from the list after some months and patients offered appointments who did not attend or declined would be those waiting long enough to be admitted. HES has no knowledge of these patients, since they are not admitted, but we can estimate the effect of including them in the HES distribution in Figure 1. All in all, it is unlikely that there would be sufficient cases with sufficiently long waits for this factor to explain the difference observed, but it may be a contributing factor.

c) HES measures are inclusive of periods of suspension from the waiting list
The HES time waited is not adjusted for periods of suspension from the waiting list, so will have longer average waits. There is no basis on which to estimate the impact of this factor, except to note that HES continues to record patients apparently waiting more than 15 or 18 months, whereas the waiting lists indicate that nobody now waits this long on the official definition. This implies that at least some tens of thousands of patients spend time suspended from the waiting list (probably more), so it seems reasonable to assume that this could affect the median times waited by some days, but in the opposite direction from that observed.

d) HES includes patients suspended from the waiting list
One other effect of HES including periods of suspension is that the HES distribution of patients waiting at 31 March will include some patients who were actually suspended at the time and therefore not included in the official waiting statistics. These may or may not be biased towards long waiters but, if they were, the effect would be to increase the HES median (as for c) above) and not explain the lower HES median.

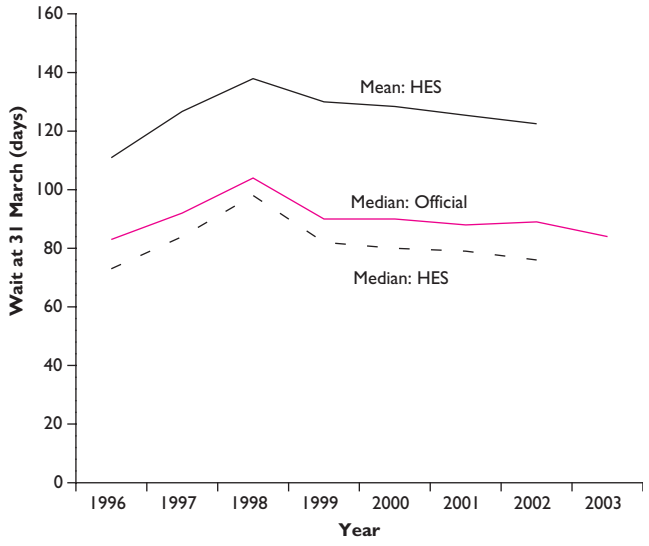
e) HES waits exclude cases with unknown time waited
HES time waited statistics are based on valid cases, taking these as representative of all cases. However, around 11 per cent of HES admissions do not have a valid time waited. If these invalid cases tended to have longer waiting times, and were all included in the official waiting figures, this could explain part of the difference in the medians observed. For it to explain the full difference, the median of the unknown cases would have to be at least 50 days higher than the known ones. But a smaller difference in the median of invalid cases might nevertheless contribute to the observed difference in overall medians.

f) Official waiting times are measured in bands
The median waiting time calculated from the official statistics is based on statistics collected in three-month bands. The calculation of the median assumes a linear trend within the three-month band where the median lies. However, the HES distribution shows that it would be a smoother curve if measured in days, especially given that the official median waiting time for March 2001 was in the first band, 0 to 3 months. Consequently the linear estimate may be up to six days higher than an estimate based on a curved distribution like HES. This factor should now be diminishing, since waiting bands became narrower from 2002. However, it seems to provide an explanation for the majority of the difference between the HES and official median waiting times to date for the years studied.

at Figure 1 was constructed using HES data for all years since March 1996 (taking only those admissions occurring in the year immediately following) and averages calculated. Figure 2 shows that the resulting series move broadly in with the official median waiting time, albeit at a slightly lower level as discussed above.

This is an important finding, since it shows that the trend in the official median waiting time is consistent with the data observed in HES. This implies that if there are any inherent inaccuracies in one source, there must also be inaccuracies in the other to bring them into line. It seems likely that the difference in the trends for the overall HES averages is therefore due to the flow of patients through the system.

Figure 2 **Trend in median waiting time and HES time waited to date for patients waiting on 31 March and admitted in the subsequent year**



HES DISTRIBUTION OF TOTAL WAITING TIMES

Taking the same HES patient cohort as above, ie restricted to those waiting on 31 March 2002 and admitted in the following year, it is possible to graph the total time waited before admission rather than the wait to date as in Figure 1. The distribution of the total number of days these patients waited for elective care before admission is shown in Figure 3.

This distribution shows the following aspects:

a) A bulge in patients being admitted within a few months, with a peak at 56 days.
b) Peaks in admissions reflecting the service responding to waiting time targets and clearing longer waiters.
c) A long tail stretching to a total waiting time of several years (unadjusted for periods of suspension), which was cut off at 4 years in this analysis (and 1,000 days in Figure 3).
d) A mean of 231.4 days and a median of 211 days total time waited. These figures are higher than the average patient experience because relatively more long waiters will overlap the 31 March than short waiters who join the list and are treated rapidly. So the cohort of less than a million cases is biassed towards long waiters compared to the total flow of around four million cases per year.

Figure 4 shows that this distribution has changed markedly over time, more so than the wait to date shown in Figure 1.

The trend in the mean and median waits of the distributions in Figure 4 (including the tails up to 4 years) are compared in Table 1. Despite the fact that this is exactly the same cohort of patients as in Figure 2, it is interesting to note that the trend in the total wait mean and median is different from that of the wait to date mean and median, see Figure 5. The peak in 1998 is even more marked and the median of the total wait increases each year from 1999.

Figure 3 **Distribution of HES total time waited for those waiting at 31 March 2002 and admited in the following year**

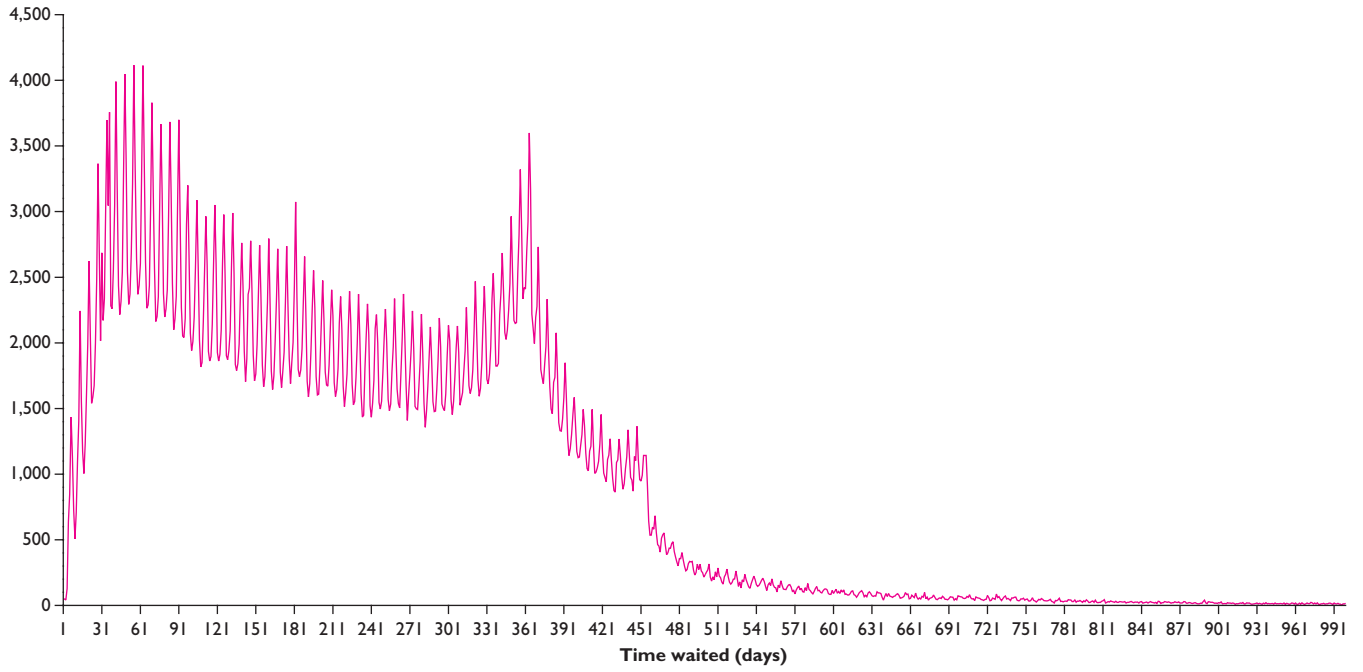


Figure 4 **Distribution of HES total time waited for those waiting/booked at 31 March and admited in the following year: In-year admissions, 7-day moving average**

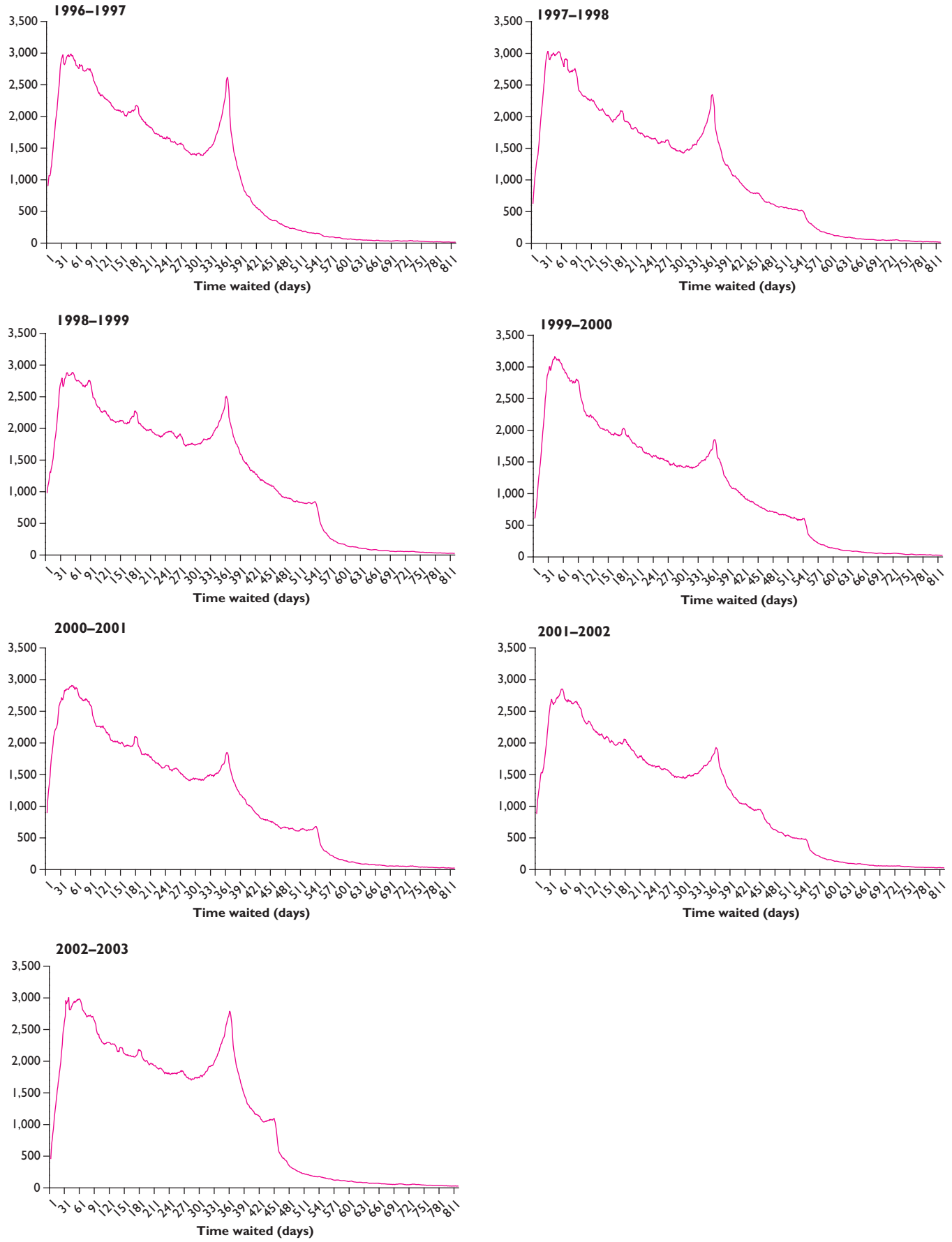


Table 1 **Comparative measures of average waiting time and total time waited**

	Official Waiting Time	HES waiting time to date at 31 March yyyy		HES total wait for patients waiting at 31 March yyyy		HES total wait for all admissions in year starting yyyy	
	Median	Mean	Median	Mean	Median	Mean	Median
31 March 1996	83	110.9	73	206.9	182	82.2	40
31 March 1997	92	126.7	84	229.9	202	89.3	41
31 March 1998	104	137.9	98	247.8	228	98.9	45
31 March 1999	90	130	82	231.1	198	90.5	43
31 March 2000	90	128.4	80	231.5	200	92.9	44
31 March 2001	88	125.4	79	234.2	204	95.7	47
31 March 2002	89	122.5	76	231.4	211	98.7	49
31 March 2003	84	n/a	n/a	n/a	n/a	n/a	n/a

n/a Not yet available.

Figure 5 **Trend in median waiting time and HES total wait and time waited to date for patients waiting on 31 March and admitted in the subsequent year**

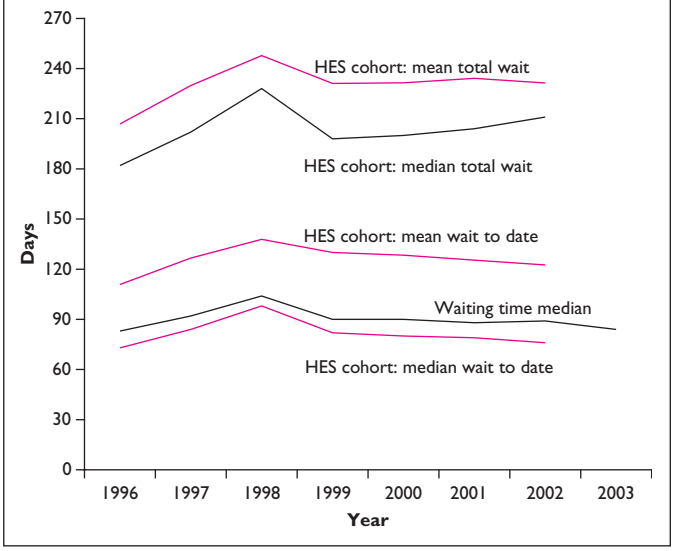
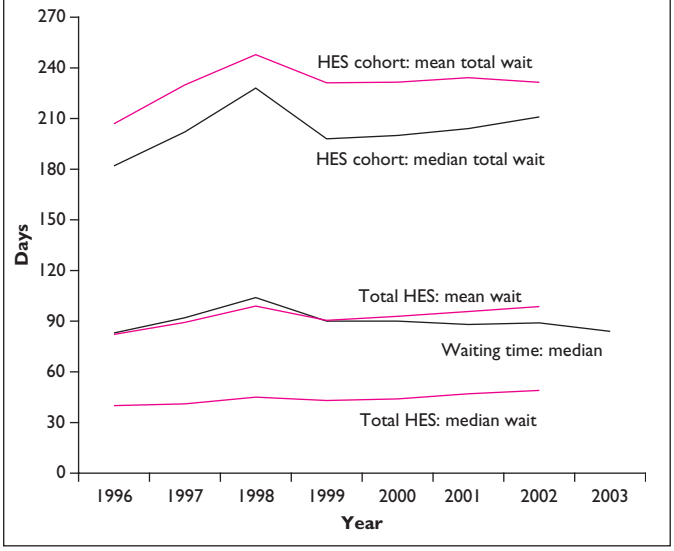


Figure 6 **Trend in mean and median HES total wait time overall and for patients waiting on 31 March and admitted in the subsequent year**



The increase in the median HES total wait of this cohort in recent years is explained by Figure 4. The tail of long waiters is being drawn in more, apparently achieved by a greater focus on longer waiters and so an increase in admissions of longer waiters. In due course, this should allow the median to fall again as more waiters are admitted earlier.

HES cohort compared with overall HES times waited

The analysis above demonstrates that the trend in the median wait to date of the HES cohort of cases waiting at 31 March is different from that showing total wait. The two series even move in different directions for a time for exactly the same set of cases. However, overall HES analysis does not reflect a single cohort but a flow of patients being admitted over time. Since the throughput of shorter waiters is greater, the overall HES mean and median waits are much shorter than the cohort values.

Figure 6 compares the HES all-admission mean and median times waited for each year commencing 1 April against those values from the cohort of 31 March waiters. As expected, the overall figures are much lower and the peak in the median for 1998–1999 is less marked. However, the overall HES median time waited shows the same rise from 1999–2000 as the cohort analysis. We deduce that this overall rising HES trend is not inconsistent with a fall in the official median wait to date, since it was demonstrated not to be so for the cohort of HES waiters.

Conclusions

This analysis demonstrates that the two sources of information on the national waiting experience of admitted patients are consistent.

It shows that HES data can be used to look at the experience of patients on the waiting list on a particular date. By doing this, it is possible to plot the distribution of how long patients have waited so far in one-day intervals, giving a median figure similar to, but somewhat below, the official median waiting time. Various factors help to explain why the HES median is lower and the medians from the two sources have moved broadly in unison over the past six years.

The analysis further shows that whilst the median wait to date from HES follows the trend of the official waiting time series, the median total wait for the same cases more closely follows the overall HES median trend. This demonstrates that different ways of measuring waiting experience can lead to different trends and this does not imply some inherent inconsistency between (or within) the data sources.

Key points

- Figures from the two currently available sources of information on the national waiting experience of NHS patients admitted to hospital are consistent.
- However, differences in the way waiting experience is measured (waiting time of people on a list compared to completed waiting time) can lead to different trends without implying any inconsistency between the two sources.
- Recent trends from both souces mainly reflect the reductions in the proportion of long waiters on hospital lists.
- Hospital Episodes Statistics data can be used to look at the experience of patients on the waiting list on a particular date.

References

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