

Modelling Hospital Activity, Bed Requirements and Staffing: the benchmark hospital

Our projections of inpatient admissions and day cases expected in Guernsey, and the beds needed to process these, derive from a benchmark model based on NHS performance in England during the 2011-12 financial year. The model incorporates a database of the total numbers of admissions and day cases, and average lengths of stay, in each of the specialties recognised and recorded in the NHS, in each of seven age bands. These data, together with the age breakdown of the population of England, enable calculations to be made of the admissions and day case rates per 1,000 population in each specialty and age band.

These rates can then be applied to the age structure of Guernsey, to determine the pattern of specialty caseloads that would occur in Guernsey if its health services performed in the same way as the NHS. In order to make the projections realistic adjustments were made for the difference in birth rate between England and Guernsey, and for the proportion of patients in each specialty who are treated overseas – see further explanation below.

It is implicit in this approach to projecting caseloads that the population of Guernsey is assumed to be similar to that of England in terms of its vulnerability to ill health and its propensity to seek treatment for it, in each of the seven age bands.

Adjusting for age

The age bands used for the purpose of modelling are as follows:

0	-	4
5	-	14
15	-	44
45	-	64
65	-	74
75	-	84
85	+	

Each of these age bands has its own characteristics in terms of the need for health services. However, in recent years activity data provided routinely by the NHS has been grouped in four age bands, as follows:

0	-	14
15	-	59
60	-	74
45	-	64
75	+	

These groupings are considered to be too broad for health planning purposes. We therefore made use of fully disaggregated data from an earlier version of the model to estimate the breakdown of the 2011-12 caseload within each of these four bands into the seven bands listed above. This process of estimation may have led to some inaccuracies in the projections which, however, are not thought to be significant in the context of this review.

Adjusting for the outflow of patients

We have been provided with data on the numbers of overseas referrals requested, and those actioned, by specialty and mode of care, ie. inpatient or outpatient. Interpretation of these data - in terms of the proportion of the total caseload that they represent - is not straightforward.

Firstly, it is known from various studies of island health services that there is a 'distance effect' such that some of the expected caseload tends to be lost when patients have to travel off island, even when the care is free of charge and the travel costs are met. This distance effect is found also in

health services serving remote communities whose populations need to travel significant distances to access care. In the case of Guernsey, it is probable that an (unknown) proportion of the population make their own arrangements when overseas care is needed, and are therefore not included in the HSSD database. The database itself shows that there are more referral requests than actioned referrals, which again suggests that there is a 'missing caseload'.

Secondly, comparison between the projected and recorded caseloads yields anomalous results which complicate the assessment of the percentage of total caseload that is handled off island. It might be expected that a specialty that sends a significant proportion of its patients overseas would have an on island caseload slightly below the unadjusted projected level. However, this is not always the case: some recorded caseloads are too far below the projected level for the difference to be wholly explained by overseas referrals, and others have higher than expected caseload in spite of the presence of overseas referrals. In part these problems arise from a blurring of the boundaries between specialties: in a hospital such as PEH, with a limited range of specialists, some procedures may be undertaken by a generalist with special clinical interests rather than a fully fledged specialist as would normally be the case in a large NHS hospital. As a result, activity rates in the major specialties may not be strictly comparable with their equivalents in the NHS, although of course the total level of inpatient activity would not be affected by these issues of definition.

Finally there is the issue of inpatient versus outpatient care. It is not necessarily the case that a patient treated as an inpatient off island would have been treated as an inpatient on island, had the care been available there. Conversely, an off-island outpatient cannot be compared with an on-island one, because this patient may become an inpatient in due course.

For all of these reasons we have made our own assessments of the proportion of the expected caseload in each specialty that is either handled off island or is lost altogether as a result of the distance effect. These assessments were based on an overview of all of the evidence we have seen, plus our general understanding of the likely pattern of events in a situation such as Guernsey's. The figures are listed below.

SPECIALTY	% OUTFLOW
General Medicine	0%
Paediatric Medicine	15%
Geriatric Medicine	0%
Cardiology	75%
Chest Medicine	0%
Dermatology	5%
Gastroenterology	75%
Genito-urinary Medicine	100%
Infectious Diseases	100%
Nephrology	15%
Neurology	100%
Oncology	15%
Rehabilitation	0%
Rheumatology	95%
Other Medical Specialties	100%
General Surgery	10%
Trauma & Orthopaedics	20%
Cardio-thoracic Surgery	100%
ENT	20%
Neurosurgery	100%
Ophthalmology	25%
Oral Surgery	90%
Paediatric Surgery	100%
Plastic Surgery	100%
Radiotherapy	100%
Urology	25%
SCBU	0%
Obstetrics	0%
Gynaecology	20%
Accident & Emergency	0%
Anaesthetics	0%
Pathologies	75%
Radiology	20%
Adult & Child Psychiatry	10%
Old Age Psychiatry	0%
Mental Handicap	0%

The effect of these assumptions is to reduce the projected caseload by about 35 percent by comparison with what would be expected if the island were totally self supporting in health services. The projected loss of about 7,000 cases compares with the HSSD record of about 600 actioned NHS inpatient referrals and 2,100 outpatient referrals in 2012. This large difference between the two sets of results points up the issue of lost, or privatised, caseload. In spite of this difference, it can be seen from Table 2 in the main report, that there is a close match between the total recorded and projected inpatient and day caseloads, even though there are significant differences in individual specialties, as discussed in the main text.

Day cases and day patients

The projections for day case workloads in each specialty derive from the model's database in the same way as that used to project inpatient admissions, as described above.

For purposes of comparison, data was provided on the breakdown of the specialty caseloads into inpatients and day cases. Unfortunately the day case data included day patients and diagnostic activity that should be separated out to allow meaningful comparison with the projections for day case activity. The extraneous activity included a certain amount of diagnostic activity that would normally be recorded elsewhere and not treated as a patient 'case' as such. To facilitate the necessary disaggregation we made use of a ward based breakdown of day cases and day patients provided to us for this purpose. Because the data are ward based the specialty groupings are broad and do not match the normal detailed specialty codings. Also, the totals do not match the total caseload figure on which the rest of the analysis is based. Nevertheless we were able to use the data to make estimates of the proportions of day cases and day patients in each of the specialty totals for day cases plus day patients. Our estimates are summarised below.

- Geriatrics, oncology, nephrology, obstetrics, anaesthetics, psychiatry - all of the day case plus day patient totals in these specialties are to be treated as day patients. There are, therefore, no day cases.
- Gastroenterology – it was estimated that 80 percent of the day case plus day patient total is diagnostic activity not normally treated as a patient 'case'. The remaining 20 percent are day cases.
- Paediatrics – 45 percent of the day case plus day patient total is day patient activity, the remaining 55 percent being day cases.
- All other specialties – 20 percent of the day case plus day patient total is day patient activity, the remaining 80 percent being day cases.

This analysis results in a total of 4,969 day cases and 7,546 day patients and diagnostic activity. The day case estimate is thought to be a credible estimate, supporting the view previously expressed to us that the hospital has a better day case ratio than the average NHS trust in 2011-12.

Modelling bed requirements

The projections of specialty inpatient bed requirements from the projected inpatient admissions derive from the age and specialty specific average lengths of stay contained in the model database, plus specialty specific assumptions/targets for turnover intervals. The use of turnover intervals rather than occupancy rates is thought to be a more satisfactory approach because the turnover interval is a generally sound measure of managerial efficiency whereas occupancy is a secondary derived result. The use of age specific lengths of stay is necessary to demonstrate the impact of differences in age structure: older people tend to stay longer in hospital, so that hospitals serving populations with a high proportion of older people tend to need a larger number of beds per 1,000 population. In the case of Guernsey, allowing for the outflow of some specialty work as well as the age structure, the projected acute bed index is 2.27 beds per 1,000 population, excluding psychiatry.

Day case requirements have been projected on the assumption that the day case unit operates 10 half day sessions per week, and that 50 percent of day cases can be processed within a half day session, with the other 50 percent needed a full day's care, ie. two sessions. An occupancy rate of 75 percent is assumed, which allows for timetabling issues, including fluctuations in caseload and the availability of surgeons and other specialists who make use of the day case beds.

Modelling staffing needs

Medical Staff

The staffing projections are based on the specialty workload projections, and involve the use of specialty specific throughput rates derived from the NHS in England in 2011. As with the disaggregation of 2011-12 NHS hospital activity, discussed above, there was a need to further disaggregate the total numbers of hospital specialists routinely provided by the Department of

Health. Again use was made of an earlier version of the model to disaggregate totals to individual specialties. This means that there may be some inaccuracies in the detailed projections. The total numbers of consultants, registrars and other grades is correct, however, and reflects the current structure of the medical profession in England.

For the purpose of the projections, throughput was defined in terms of the total number of cases, (inpatient and day case) per consultant, in each specialty. Allowances for registrars and other grades were then added in the same proportions as exist in the NHS. It should be noted that in purely numerical terms the NHS is not as productive as once it was, as limitations on working hours, and training requirements, have reduced the numbers of patients that it is feasible for a doctor to handle in a year. This has led to a more civilised life style for some doctors and, arguably, to an increase in the quality of care. This means that on average a hospital consultant, plus his team of junior doctors, will handle 460 inpatients and day cases per annum, plus their associated outpatient clinics.

Nursing Staff

Projections for hospital nursing staff have been made on the basis of the population structure served. The numbers broadly reflect the position in the NHS in England in 2011, including the major increase in the numbers of qualified nurses over the last ten years or so. However, numbers of nursing assistants, including auxiliary and unqualified nurses, are understood to have remained broadly stable in relation to population numbers in recent years.

It is recognised that in a small hospital such as PEH scale effects can arise in relation to the staffing of wards with small numbers of beds on a 24/7 basis. These scale effects can increase the numbers of nurses required. No account of this is taken in our modelling, so the numbers presented should be regarded as the minimum feasible staff complement.

Professional, Scientific and Technical Staff

Staffing for these categories has also been projected on the basis of the population served. The ratios for each category of staff include adjustments for the increases over the last ten years or so in the NHS in the numbers of imaging and pharmaceutical staff, and the reduction in diagnostic laboratory technical staff, reflecting the impact of automation on laboratory work.

Facilities Management Staff

Projections for these categories are based on the projected bed numbers, with staffing levels reflecting those planned by a private finance initiative (PFI) in England (more efficient than the average NHS service but still achievable).

It is acknowledged that in NHS hospitals many of these services are procured in part or in whole from external contractors, and that this reduces the numbers employed directly by the hospital. This issue is however not relevant to our PFI based projections because PFI contractors are responsible for providing all of the necessary staff.

Management, Administration and Clerical Staff

Projections for these categories are also based on the projected bed numbers, using ratios derived from NHS staffing levels.