NHS GREATER GLASGOW

INDEPENDENT ASSESSMENT

OF

HOSPITAL BED REQUIREMENTS

November 2005

FINAL REPORT

18th November 2005

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INTRODUCTION

1. NHS Greater Glasgow is undertaking a strategic review of acute services across the City and as part of this review commissioned CHKS to provide some supporting analysis. Phase I of CHKS’ work was to help gain insight into current performance in specialties and functions within North and South Glasgow University Hospitals respectively (the Acute Divisions). This was carried out in late 2003 based on 2001/02 patient data, the most complete data available at the time. This analysis was subsequently updated when 2002/03 data became available.

2. Phase II, (reflected here) a strategic bed modelling review, was undertaken to provide an objective prediction of likely future bed capacity, to a planning horizon of 2013/14. The aim is to provide insight into what the future number of acute inpatient beds would be in the light of performance improvement (benchmarked lengths of stay, day case and occupancy rates), changes in demand arising from the catchment population and other possible shifts in patient flows in and out of Glasgow. A number of possible future scenarios were modelled. The findings from this work are reflected in this report. This bed modelling was based on 2002/03 patient data with baseline bed numbers subsequently reconciled against data for the period 2003/04.

3. There are however a number of important considerations and caveats to be borne in mind when reflecting on the findings of the capacity modelling. These are:

   • The analysis is based on the clinical inpatient and day case activity as recorded by both Acute Divisions, submitted to the Health Board via the ISD returns.

   • This exercise is not designed to give an absolute number as to the future beds that are required. Rather, the aim has been to test different possible scenarios to indicate what the future capacity might look like if these factors came into being. The overall purpose is to create for NHS Greater Glasgow a sound framework to inform discussion between clinicians and managers, within which objective decisions about future bed capacity can be taken. It is not intended to be prescriptive rather to inform.

   • The analysis should enable NHS Greater Glasgow to define the future acute bed requirements. The analysis does indicate capacity within
both North and South Acute Divisions that is currently deemed acute (particularly for long-stay elderly), which could be accommodated in non-acute, step-down or community setting.

- It is important to note that in redefining what are acute beds decisions need to the taken concerning that element of patient activity (currently within the acute setting) that will be excluded (particularly relating to post acute care) in terms of how care for these patients is to be provided in the future.

- Comparisons have been adjusted for case mix on a range of criteria

- Comparison with 2 peer groups – a) upper quartile performance of teaching hospitals and b) inner city peer (across CHKS database) has been applied using specialty specific peers. While it is recognised that it is unlikely that no hospital will be achieving this level of performance in all specialties, it nevertheless provides a reasonable target for planning 10 years in the future.

- The following assumptions apply:

  *That the population will change across Glasgow in line with the mid-year estimates provided.*

  *That hospitalisation rates (within the age/sex bands of population) over the planning period will remain similar to the baseline year.*

- The capacity modelling exercise was initiated when the former North and South Divisions were first a) operating as separate Trusts then as b) Operating Divisions – hence the comparisons on a North and South basis in this report.

- Finally, it is acknowledged that with single system working about to be implemented across NHS Greater Glasgow that it is now appropriate for bed capacity modelling to be carried out on a pan Glasgow basis, which has now been reflected in GGNHSB’s subsequent work to this report.

**SCOPE OF BED MODELLING EXERCISE**

4. The Divisions deliver general and acute services from five main acute units; the Glasgow Royal Infirmary, Stobhill and the Western Group of Hospitals in the North Division, and the Victoria Infirmary and the Southern General in the South Division. The following paragraphs indicate what adjustments have been made to the baseline activity and the planning assumptions applied.
Activity

5. At the request of the Health Board, plastic surgery activity from Canniesburn and all services at Lightburn Hospital were added to activity totals at the Glasgow Royal Infirmary. Oral surgery activity from Canniesburn and care of the elderly services at Cowglen were added to activity totals at the Southern General. In addition, activity recorded to Mansion House was added to total activity at the Victoria Infirmary. Activity recorded to the specialties of medical oncology and clinical oncology was excluded from the review.

6. Data coded to significant facility code 1M (transplant unit) at Glasgow Royal Infirmary and data relating to the ward for younger physically disabled and the spinal unit at Southern General were excluded from the review. Full details of re-aligned and excluded data are set out in Appendix A.

Waiting Lists

7. Projected elective activity to 2013/14 was adjusted to include additional activity to deliver National waiting time targets. This increased level of activity was assumed to remain constant over subsequent years to maintain shorter waiting times. Refer to Appendices F & G – Section I – Waiting Times for details.

Additional growth in emergency admissions

8. At the request of the Acute Divisions, consideration was given to potential growth in medical emergency admissions at an annual rate over and above demand arising from population change. There was a perception that the Acute Divisions were recently experiencing as much as a 5% increase year on year, a relatively high rate to apply, though it apparently reflects the recent experience. National Beds Inquiry undertaken recently in England suggests applying maximum rate of 2.5% for general medical emergencies.

In response to this the Health Board undertook a retrospective review of growth rates over the last seven years for every speciality. The outcome of this analysis indicated that there has been significant growth in patient episodes (FCEs) of 3.2% per annum but much lower growth in actual numbers of patients admitted and in bed days utilised. The actual average growth in the latter over a seven year period were +0.7% per annum for patients admitted and –5.3% per annum for emergency bed days consumed, respectively. Therefore a growth rate of 0.7% applied to general medicine would seem appropriate.

Characteristics of Bed Model

9. CHKS has undertaken the assessment of bed requirements by modelling activity, performance and other factors in order to identify bed needs for a range of given criteria. The purpose of the bed model is to measure the extent to which changes in clinical performance may impact on the need for acute
hospital beds for each bed-holding acute specialty, based on changes in aspects of performance and the level and mix of patient activity.

10. The model focuses upon those patients actually admitted into hospital and takes no account of the extent to which patients (particularly emergencies) were not admitted due to unavailability of acute beds, i.e. unmet need. Though waiting lists have been factored in taking account of a section of unmet need.

Population change

11. CHKS examined bed utilisation at specialty level for specified age groups in order to estimate the likely impact of a changed population base on service demands and facility requirements. A summary of population estimates is set out in Appendix B.

12. In overall terms, demographic forecasting suggests while there is no real overall change in the NHSGG population over the period 2002-2016 the trend is towards an increasing elderly population. It should be noted that the largest reductions are anticipated in the 15-44 age group, whereas the 45-59 age group shows the greatest increase over the same period.

13. The modelling process also predicates that those areas of hospital performance (principally length of stay), which are identified as already exceeding the best performance of the peer group, remain unchanged. It is only those aspects showing a negative variance against peers which are optimised in line with the peer group performance. In the case of any un-coded or low volume activity, the model does not apply peer performance.

14. It is also important to note that where the model shows, on current service volumes, a bed reduction for any particular specialty, it is merely identifying the number of beds the specialty would have required to treat those patients it admitted during the period. It does not necessarily follow that these “excess” beds are not needed, but by working more efficiently, (in terms of length of stay) they may have been used to meet the demand of emergency admissions or increases in activity.

METHODOLOGY

15. CHKS bed modelling relies on the ability to calculate the number of in-patient and day case beds required by each specialty to support a given volume of case mix adjusted activity. This is achieved by measuring the impact of alterations to the specialty’s average lengths of stay, occupancy rates and day case rates with reference to a peer group of matched specialties. Thus, for a given specialty, activity is divided into elective and non-elective episodes and then into individual Healthcare Resource Groups (HRGs) which are, in turn, banded by admission type, age group and discharge destinations. The Acute Division’s average length of stay is then compared against that for the same HRG category from the relevant specialty peer group. Only if that HRG is present within the peer group’s activity and it includes at least 10 Finished Consultant Episodes
(FCEs) – in both Division and peer data – and its average length of stay is shorter than the division’s is it applied. Where any one of these criteria is not met, the Division’s own average length of stay for that HRG is retained.

16. Within the above, activity is also sub-divided by episode type, namely admitting, intermediate and discharge episode. This has the dual effect of adjusting for different Divisions’ service configurations, such as transfer between specialties, and adjusts for different approaches to treatment of data, such as the variable extent to which hospitals generate episodes, a well-known compounding factor in length of stay analysis.

17. In order to calculate day case bed requirements, the model uses a Bed Utilisation Factor of 288 as defined by the Royal College of Surgeons, which allocates day beds on the assumption that each bed will handle 1.5 patients per day and be available for 48 weeks of the year.

18. In modelling in-patient and day case beds separately, FCEs are divided into those with at least one overnight stay (“in-patients”) and those discharged on the same day (“day cases”). This approach therefore excludes from the in-patient count emergency admissions that were discharged on the same day of admission. Whilst it is recognised that these patients may well have occupied an in-patient bed, which, consequently, was not available for the remainder of the day, their length of stay is counted as zero and their impact on in-patient beds is therefore ignored. Instead, the model makes provision for them elsewhere (refer to Appendices F & G). In part, this approach has been adopted to reflect the circumstances in which an admissions/assessment ward could be used to hold and monitor such patients prior to their being admitted to an in-patient ward or, alternatively, discharged.

RECONCILIATION OF BEDS TO ACTIVITY

19. The first stage of the modelling process attempts to reconcile patient activity, about which CHKS already holds data, with bed numbers provided by the Divisions. The baseline period for patient activity was agreed as April 2002 to March 2003. The Divisions agreed occupied and available bed days for specialties within North and South Glasgow Acute Divisions.

20. It should be noted that for the Neurosurgery in the South Division the apparently low occupancy rate of 65% reflects the inclusion of paediatric neurosurgery beds, which tend to experience a low utilisation. For the 70 adult beds in this specialty the average quoted occupancy rate is 80%.

21. An overall occupancy rate of 81.8% for North Glasgow Division is in line with the 82% as suggested by the National Beds Inquiry (undertaken for England by the Department of Health), and 83.3% for South Glasgow Division is slightly higher than the NBI suggests.
22. Information about bed availability and occupancy is largely based on specialty definitions (adjusted for significant facility codes as suggested by NHSGG). It should also be noted that in order to facilitate comparison with hospitals across the wider NHS, CHKS have mapped Coppish codes to the Korner definitions used in the rest of the NHS. Reconciliation of bed modelling to Division reported availability is influenced by the following factors:

- Bed numbers and occupancy rates quoted for acute specialties are a reasonable approximation of likely bed availability and utilisation in 2002/03.

- Bed numbers for care of the elderly / rehabilitation are about correct in aggregate BUT accurate calculation by facility/specialty within the complement is difficult. CHKS have calculated bed complement based on significant facility code, which may not have always fully described how the beds in question were used. A separate modelling exercise based on more-up-to-date data submissions may be necessary to fully encapsulate proper description of these beds.

- Performance (as measured by length of stay/occupancy rates etc.) has NOT been benchmarked for elderly long stay patients (because other trusts do not use the same classifications). Status Quo assumptions about longer stay elderly/rehabilitation patients will be used throughout CHKS modelling (except when separating out patients who have exceptionally long stays - defined as LOS> 30 days + median LOS for conditions associated with continuing care).

**Updating to 2003/04 data**

23. CHKS updated the baseline reconciliation, as a check, using data for 2003/04 financial year. These figures were reconciled with the quoted bed complement figures provided by the Divisions via the Health Board. Generally, the overall numbers closely reconcile and the bed numbers in 2003/04 are in line with those shown for 2002/03. Therefore, the projected variances indicated in this report would seem to be sound.

24. After the bed baseline has been established, the bed model allowed performance and patient activity criteria to be altered so that the effect on bed requirements can be shown. There were six dimensions whereby Division activity and performance were varied and measured:

- The volume of activity as affected by population change
- Peer group (1) length of stay performance
- Peer group (2) length of stay performance
- Peer group (1) day case performance
Peer group (2) day case performance

Improved Bed occupancy

These criteria were selectively applied to the baseline activity and bed volumes, to provide a series of “predictions” of the quantitative consequences of different combinations of planning assumptions and performance levels. Please refer to Appendices F & G for full details.

KEY SCENARIOS

25. The bed model used levels of patient activity to reflect the following scenarios:

- Actual activity for the April 2002/2003 period, which was already held by CHKS (called current activity in the model) i.e. the baseline

- Projected activity and beds to 2013/14 based on current performance

- Projected activity and beds to 2013/14 assuming both Divisions operate at the expected performance (length of stay, day case rates) of both the inner city peer group and upper quartile peer group of hospitals respectively.

- The above with the addition of improved bed occupancy rates

PEER GROUPS

26. The Divisions’ performance has been measured against two peer groups (aggregated data sets) – see Appendix C for details:

- A *Top Teaching Hospital Peer Group*, which represents a benchmark comprising UK teaching hospitals which have achieved CHKS 40 Top Status in 2003. The Top 40 Programme is open to all CHKS subscribing trusts and identifies top hospitals against a rigorous set of performance criteria covering efficiency, accessibility and outcome variables. In the case of smaller specialties, it was necessary to supplement the Top Teaching Hospital Peer Group with trusts who failed to achieve 40 Top status. This ensured sufficient comparative data within the peer group.

- An *Inner City Peer Group* selected on the basis that, like Glasgow hospitals, each trust serves a catchment area characterised with large pockets of urban social deprivation.

27. For all peer groups, NHSGG Divisions’ performance has been compared on the case mix and activity band basis described above.

DAY CASE PERFORMANCE
28. Modelling the effect of changes in day case rates is complicated by the difficulty in reliably quantifying the extent to which increases in activity occur as a consequence of a migration of existing in-patient activity, or because of new activity. Given this uncertainty the model assumes all changes in day case rates are as a result of a switch from in-patient to day case. Thus the impact of these changes will inevitably lead to a decrease in the requirement of beds for the former and an increase in the requirement of facilities for the latter.

29. Day case rates are taken from each peer group and applied, on a case mix adjusted basis, where the peer rate is higher. This has the effect of transferring activity from an in-patient to a day case category. In each instance an assumption has been made that, on average, each transferred day case would have had an inpatient stay of 1.5 days. This is felt to be a more sensitive indicator than taking average inpatient stay.

30. Under day case beds, the model differentiates between Day Case beds i.e. elective day cases and what are termed Emergency Day Beds. The latter account for, and assign a capacity to, emergency admissions/FCEs with a zero length of stay. Please refer to Appendices F & G for full details.

BED OCCUPANCY

31. Bed occupancy is an additional dimension to bed use. As stated above, historic occupancy in the South Division was higher than that suggested as achievable within the National Beds Inquiry. Two bed occupancy scenarios have been used within the model. The first takes the Divisions’ current occupancy rates and applies it to the various performance situations. The second scenario is based on experience of what may be technically achievable at a specialty level. These rates have been derived from a number of reviews and are felt to reflect reasonable performance. Interestingly, when these specialty-specific rates are applied to activity scenarios they result in an overall occupancy rate of approximately 84%, which is slightly higher than the National Beds Inquiry figure. In this sense the “improved occupancy” targets may, in aggregate, prove challenging.

RESULTS OF THE BED ASSESSMENT

32. For planning purposes, it is important to consider scenarios that show the effect of performance improvement as well as demographic changes. This being said, there is a need to agree the underlying assumptions with planning organisations.

33. The various criteria described above – the volumes of patient activity, length of stay, day case rates, occupancy and trimming – have been applied within the bed model both individually and in combination, which can produce a large number of scenarios. Because there are so many, a set of key scenarios has been identified to illustrate the main issues from this review. The bottom line results of the key scenarios are presented in Appendices F & G.
NORTH GLASGOW RESULTS

Future Demand

34. Overall, the population projections suggest no change in the catchment population by 2013/14. This however (assuming no major change in hospitalisation rates within the population) translates into a 1.4% and 1.31% overall increase in elective and non-elective hospital activity respectively. The largest increases in activity (over 3%) are anticipated in non-elective activity in medical specialties connected with elderly care. This obviously reflects the aging profile of the population of NHSGG.

35. Appendices F & G show the Division’s baseline day case rates lengths of stay in 2002/03 by specialty, and the target rates and lengths of stay for the top teaching and inner city peer groups as used in the scenario planning exercise.

36. Key findings from the modelling for North Glasgow

- Baseline inpatients beds in 2002/03 were 2254; this reduced further to 2135 at July, 2005 – the agreed baseline for performance improvement.

- Based on improved day case rates (including transferring emergency zero stays) ALOS (average length of stay) and bed occupancy, the projected bed requirements at 2013 could reduce by –
  
  i. – 243 by achieving Top Teaching Peer Performance
  
  ii. – 177 by achieving Inner City Peer Performance

- This reduction in beds would, in part, be counterbalanced by increases for;
  
  i. Waiting Times (unmet demand)
  
  ii. Population Change (demographic)
  
  iii. Growth in emergency medical activity

These variables have been quantified in a pan-Glasgow basis.

Please refer to Appendices F & G for full details
SOUTH GLASGOW RESULTS

Future Demand

37. Overall, the population projections suggest no significant change in the catchment population by 2013. This, (assuming no major change in hospitalisation rates within the population) translates into a marginal increase in patient activity for the South Division of approximately 1%.

38. These projections have been calculated from the reviewing the casemix profile of each specialty in the baseline year by 5 yr age band and sex, then relating this to projected changes in population for the same categories. The assumption is that the casemix profile and hospitalisation within these categories will remain largely the same.

Neurosurgery

39. Projected neurosurgery bed numbers have now been revised to 59, as referred to in Appendices F & G

40. Key findings from the modelling for South Glasgow

- Baseline inpatients beds in 2002/03 were 1285; this reduced further to 1243 at July, 2005 – the agreed baseline for performance improvement.

- Based on improved day case rates (including transferring emergency zero stays) ALOS (average length of stay) and bed occupancy, the projected bed requirements at 2013 could reduce by –

  i. – 185 by achieving Top Teaching Peer Performance
  ii. – 159 by achieving Inner City Peer Performance

- This reduction in beds would, in part, be counterbalanced by increases for;

  i. Waiting Times (unmet demand)
  ii. Population Change (demographic)
  iii. Growth in emergency medical activity

These variables have been quantified in a pan-Glasgow basis.

Please refer to Appendices F & G for full details
ADDITIONAL SHIFT TO COMMUNITY SETTING

41. CHKS has separately analysed the bed equivalent required for patients with conditions that have a significant rehabilitation element. The analysis focuses on specific conditions and current length of stay in the acute Divisions. Long lengths of stay here may suggest that for the post acute element of care it may be more appropriate for these patients to be in a community or less intensive setting. The aim is to help the NHSGG redefine what are to be acute beds as opposed to step-down/community beds.

42. The approach focuses on a specific range of HRGs, 75 which are classed as rehabilitation associated HRGs and 4 which relate to continuing care, such as holiday and relief care. The full list of these HRGs is contained in Appendix E. The occurrence and patient spell length of stay (total stay in hospital) of these HRGs is considered by age band.

43. The purpose is to identify bed days/capacity that fall within the community-eligible phase of care. This community eligible phase refers to hospital stays, which were beyond the acute and step-down phase. In other words, bed days associated with stays, which in excess of 30 days plus the acute phase of treatment. This is a reasonable assumption - allowing for the median LoS plus 30 days to be deemed the stay in an acute hospital.

44. The acute phase is defined as median LOS from CHKS database for the list of HRGs deemed eligible for a rehabilitation or continuing care element. Appendix E also gives details of these LoS trim points for acute phase + 30 days.

45. In the baseline scenario approximately 199 beds in total could have been freed up for patients better suited to community management schemes.

FACTORS NOT CONSIDERED

Changes in Readmission Rates

46. At present, a degree of activity in each of the Acute Divisions consists of patients who can be classified as readmissions. These are patients who post discharge are readmitted back to hospital as an emergency admission within a defined period, usually measured up to 28 days. This cohort of activity is increasingly receiving greater attention as hospitals endeavour to relieve pressures on beds. Attention is focusing on identifying those readmissions (particularly medical) that occur within short periods and subsequently have short lengths of stay. The aim is to move beyond acute medical assessment into preventing these types of admissions in the first place.

47. No anticipated reduction in readmission rates has been factored into this bed modelling, though it is an area worthy of consideration.
Impact of new type facilities

48. The projected bed capacity reflected in this report is shown by specialty and does not reflect the emergence of such developments as Combined Assessment Units etc. CHKS recognise the current profile of activity by specialty is likely to change over the planning horizon and a degree of re-profiling of beds by specialty is inevitable. The introduction of combined assessment will take a proportion of beds from general medicine and from general surgery, for example (say for abdominal pain admissions), depending on the operating criteria for such units. Additionally, the introduction of elective centres for inpatient surgery.

Advancement in Practice/Technology

49. No assumption has been included in this modelling exercise relating to possible developments that may occur over the planning horizon due to technological advances in treatment or developments in clinical practice, e.g. drug therapies, growth in less invasive interventions. The model is really based on the assumption that the current Operating Divisions will hit a level of performance over the planning horizon consistent with the upper quartile (or inner city peer) of teaching hospitals as of now.

CONCLUSION

50. The analysis of data suggests that there is scope for improvement in performance across both Acute Divisions. The degree of improvement is differential by specialty. The differences in the number of beds required in the future based on operating at current performance or operating at the level of peer hospitals (for the same case mix) are significant and cannot be ignored or easily discounted. They will not entirely be due to artefacts in data recording. Translating the bed variances into both the capital investment and the associated recurrent expenditure, represent significant sums of money.

51. The analysis also suggests the need for the NHSGG to determine how best care for certain patients (namely elderly or major rehab conditions) could be provided post the acute spell. The data indicates significant capacity currently showing as using acute beds that perhaps could be accommodated in the community or co-located in a less intensive environment.

52. All of the analysis provides valuable food for thought, a context to inform planning decisions and a focus for NHSGG to look seriously at how performance could be improved, both in the short-term and in tandem with capital development in new hospitals.

NEXT STEPS

53. Experience shows the next step is for specialties to begin looking in detail at those conditions that seem to drive the overall variances from the peer group, to review and map current processes, ascertaining any system blockages or difficulties and develop steps that will lead to improvement.