‘Futures through the eyes of a health system simulator’

1 Background

The Health Service in the UK continues to reflect a range of key centrally determined policy and performance expectations whilst also encouraging local ownership and accountability for implementation - delivering high quality services that reflect local need.

The Strategic Health Authorities hold a key role in managing the translation of these national priorities into local action by Primary Care Trusts and Acute Hospital or Specialist Trusts. There are also now expectations of bringing into the provision of health services in the UK a greater proportion of independent sector provision with a target of 10-15% of acute provision being provided in this sector over coming years.

The role of the Strategic Health Authority (SHA) is to ‘manage’ the performance of local organisations and to approve major investments, particularly in new capital builds. They also have a key role in co-ordinating workforce plans and commissioning training from Universities in line with future capacity requirements.

In undertaking this role the SHA requires a strategic overview of policy and its anticipated impact. It was in this context that one SHA, covering a population of c.1½ million people, asked the Whole Systems Partnership to develop a ‘simulator’ that would bring together a wide range of policy and performance expectations and provide a ‘broadly right’ set of future expectations against which they could judge capacity plans, workforce plans and major investments proposals over the next 5 to 10 years.

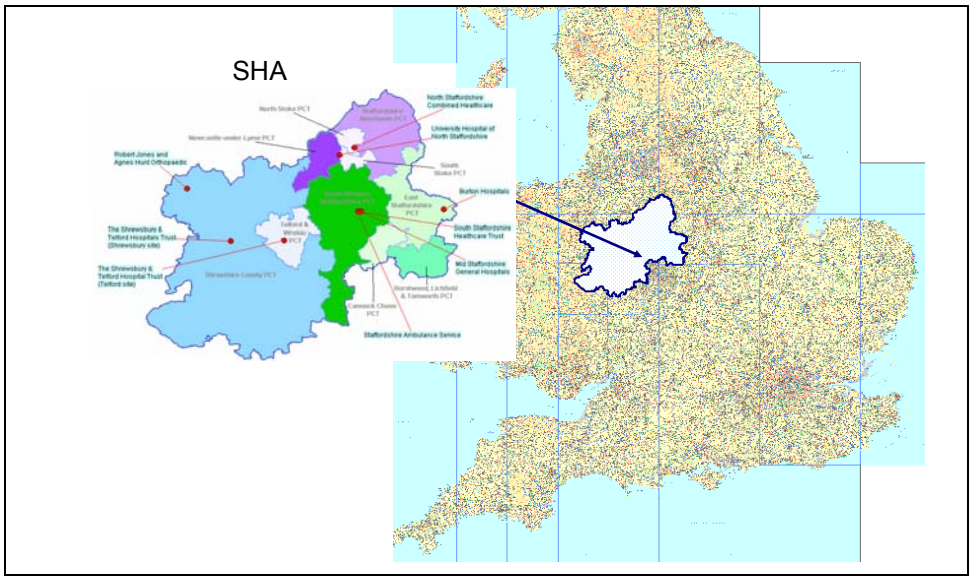

Figure 1 Shropshire and Staffordshire Strategic Health Authority

2 The challenge

As an example of the type of challenge (and sometimes confusion) faced by those setting performance targets in this system there is the case of the recently announced target for reducing occupied bed days in hospital for unscheduled admissions by 5%. How much would you give to have been the proverbial fly on the wall of ministers and senior advisors as they debated – 15%, no perhaps 10%, finally settling on 5% - and when settled on 5% is this really 12% when underlying increases in rates of access and demographic changes are taken into account?

We'll probably never know how the debate sought to marry the political with the practical expediency of setting realistic targets. How could the impact of chronic disease management be identified and specifically applied to reductions in occupied hospital bed days? What other impact on the system of care would this have? What would be the consequence of increases in emergency admissions? What other elements of the care system might impact on occupied bed days?

Of course the impact of chronic disease management on occupied hospital bed days is not the only 'tricky question'. What of the drive to reduce waiting times and the need for additional capacity - have we got the capacity being 'bought in' from the independent sector right?

The Health System Simulator has therefore sought to '*translate existing knowledge and the outcomes from the Strategic Health Authority visioning process into a flexible evidence based tool that links and quantifies the whole system in such a way as to inform medium to long term development plans'.* It has established a basis on which to develop and challenge people's understanding of how the health system 'fits together' in the context of performance targets and policy objectives.

3 The process

The process of developing the tool has included:

- Workshop sessions with Strategic Health Authority staff - designed to determine the key questions, overall architecture and focus areas within the Simulator;
- Undertaking a comprehensive 'horizon scan' with regard to social changes, policy direction and technological developments;
- The development of systems modelling skills amongst a core group of SHA staff to facilitate and test the development of the tool and ensure ongoing application;
- Discussion with a small number of 'critical friends' in refining the overall approach;
- Data collection and its validation for use in the model;
- The development of scenarios and outputs that can inform strategic policy direction, performance monitoring priorities and ongoing learning.

Ongoing use of the tool is being supported by the development of an online version of the model and a Performance Dashboard that has been informed by key levers of performance identified by the modelling work.

The 'picture' that emerged from the participative process is illustrated below. As can be seen there are considerable 'dynamics' in evidence. The way in which this

generic model of the way in which the health system was being expected to change has been translated into a systems model with an illustration of the sectors identified and built also provided below.

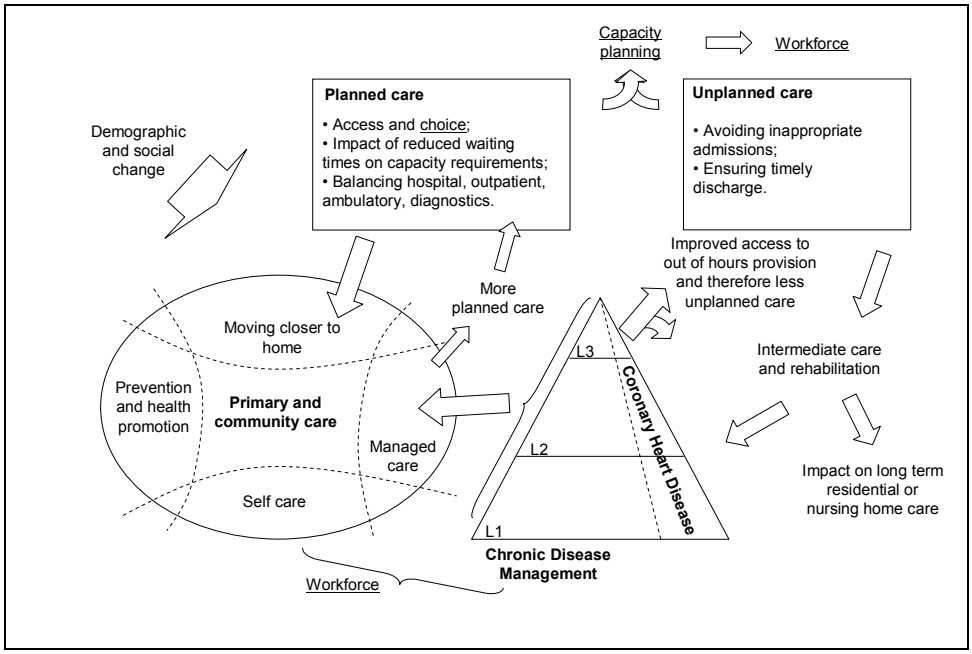

Figure 2 Combined 'mental map' of the system under investigation

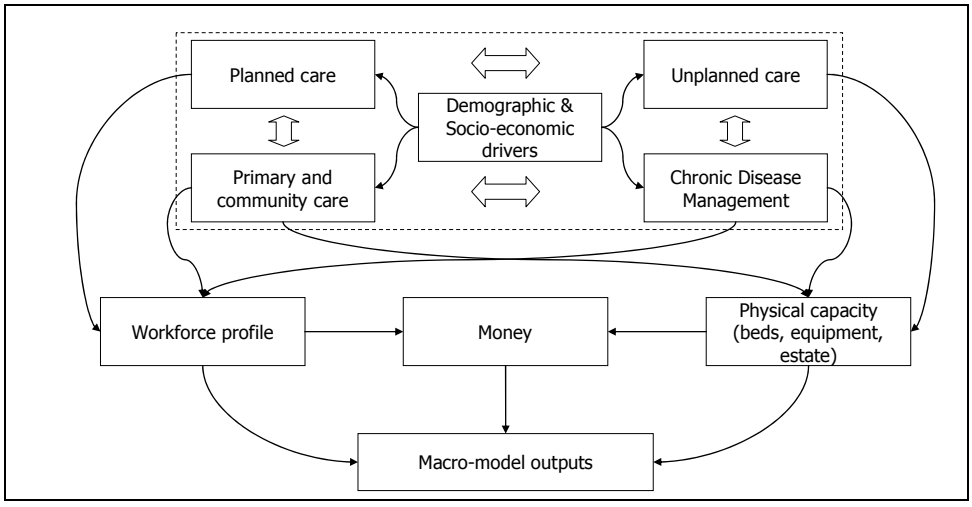

Figure 3 Sector map for simulator tool

4 Key dynamics of the system

Traditionally in health service planning different parts of the system have been planned in relative isolation. Trajectories have tended to be based on statistical projections or simple shifts, for example within the hospital sector between inpatient and day case activity. The process of engagement undertaken in this work enabled a much wider consideration of impact and feedback throughout the system as well as providing an indication of the relative scale of the different policy or strategic shifts.

The following bullet points are arranged as a 'walk-through' of the model and highlight some of the key dynamics explored with participants and reflected in the model:

- The implications of addressing the inequalities agenda through targeting and seeking to meet unmet need was seen to be 'in competition' with the desire to minimise increases in demand as a result of underlying demographic changes, particularly the increasing numbers of older people. The model enabled people to gauge the 'net effect' of these factors.
- Attending an outpatient appointment in hospital is the traditional route into the secondary care sector. Participants were keen, however, to challenge this perception and to reflect on the range of factors that would impact not only on outpatient capacity but also on the mix of work and therefore staff skills that would be required in the future. The complexity at this point in the system included an expectation that more simple diagnostic procedures or tests would be available outside hospital thus reducing capacity requirements whilst new technologies would also make it possible for previous work undertaken as day cases to be carried out in an outpatient environment. In addition there would be a move to reduce the number of follow-up outpatient visits that would occur in the hospital – part of the shift to have more nurse led clinics.
- A similar dynamic was in evidence in the day case sector. It is now 'politically correct' to assume that all hospital procedures are assumed to day case unless there are good reasons why an over-night stay is required. Capacity in day case units has been growing significantly to reflect this shift. However, in some cases the extent to which further shifts from inpatient to day cases can be achieved is becoming limited. In addition there are increasingly challenging expectations that previous day cases could be undertaken either in outpatients or in primary care. The model enabled participants to gauge, against a range of assumptions and scenarios, whether day case capacity was reaching a point where further increases would be unnecessary.
- Unscheduled hospital care is the result of personal crisis or the failure of some other part of the health and social care system. Intermediate care and now chronic disease management have been hailed as the saviours of secondary care capacity under the strain of increasing numbers of older people needing an appropriate and safe response at times of need. The key model sectors that reflect this activity are community and primary care, chronic disease management and unplanned care – each have a role to play in reducing hospital lengths of stay where appropriate, preventing crisis events and managing them when they occur. Participants in the process identified a range of linkages between these sectors that allowed an enriched and balanced appreciation of impact.

Exploring the model dynamics and sector links has provided the client with a flexible 'squeeze box' – squeeze the system here and a bubble appears elsewhere. Where and to what extent (and with what potential to explode) has not always been readily identifiable in traditional approaches to capacity planning.

5 Scenarios and outputs

The central nature of health services planning and performance expectations meant that it was possible to identify a range of targets that local health economies were being expected to achieve. The key building blocks for the tool have therefore been developed into a baseline scenario for the period up to 2007/08, with further projections to 2012/13.

The key performance changes or targets for 2007/08 that are 'wired in' to the model are:

- Achievement of the 18 wk waiting time target from referral to treatment;
- A reduction in occupied bed days for unscheduled care of 5%;
- Required investment in community matron capacity in line with the commitment for 3,000 such posts across England by 2007/08;
- Achievement of day case rates to the DoH targets for 2007/08;
- A continued shift from day cases to outpatients and primary care.

The baseline scenario has been developed using an initial 'basket' of achievable objectives that combine to deliver on these performance targets. With a 1.5 to 2% increase in underlying rates of access the initial basket consisted of:

- The removal of all over 6 week waiters for outpatients and over 6 week waiters for day case or inpatient treatment (leaving up to 6 week maximum wait for diagnostics within the overall process);
- An average reduction in the length of hospital stay for all specialities of 10%;
- A 10% shift of procedures currently carried out as day cases, half and half to outpatients and to primary care and a 10 % shift of current outpatient procedures to primary care;
- A 10% reduction in follow-up outpatient appointments;
- The appointment of community matrons in line with DoH targets and with an impact consistent with known evidence;
- Early discharge for 15% of over 75 year olds receiving unscheduled care in hospital to intermediate care settings;
- Diversion to intermediate care for 10% of over 75yr old hospital admissions from A&E.

The simulator tool provides an output in terms of changes in occupied bed days for unscheduled care as well as key capacity projections in the hospital and community sectors for both physical capacity and human resources. Any of the objectives identified above are able to be modified within the simulator tool as well as a range of other assumptions such as the underlying change in rates of access. This provides the basis for the development of alternative scenarios and the testing of sensitivities of the model to specific changes.

For the Shropshire and Staffordshire health economies the outputs from the baseline scenarios to 2007/08 are illustrated in the following table.

Total hospital bed requirement falls from 2,945 to 2,772; Outpatient rooms rise from 138 to 141; Number of Consultants rises from 588 to 606	Intermediate care clients rise c.150 to 500; A rise in direct staff costs of 4% over the 5yrs; The % spend in the community on direct staff costs rising from 36 to 40%; Additional day cases pa of c.6,500

Baseline data within the simulator tool has been derived from local capacity planning submissions, which has enabled the tool to provide an output against which local assumptions can be compared. Local assumptions, for example, do not reflect any reductions in hospital bed capacity. However, the most striking difference has been in the planned developments in intermediate care. In local capacity planning projections these were set to grow by roughly one third over the planning period, a seemingly bold projection until it is seen in the light of the capacity growth identified in the simulator tool as a consequence of hospital diversion and early discharge schemes, which is in the order of a three-fold increase.

Figure 4 illustrates the model output for the baseline scenario (profile 1) in one of the two health economies. This includes the assumption that 10% of over 75 year olds who would have been admitted are, by the end of the period up to 2007/08 diverted to intermediate care services. Profile 2 in the figure illustrates the output when this assumption is varied such that only 5% are diverted. The difference in hospital capacity that results from this change are in the order of 14 beds.

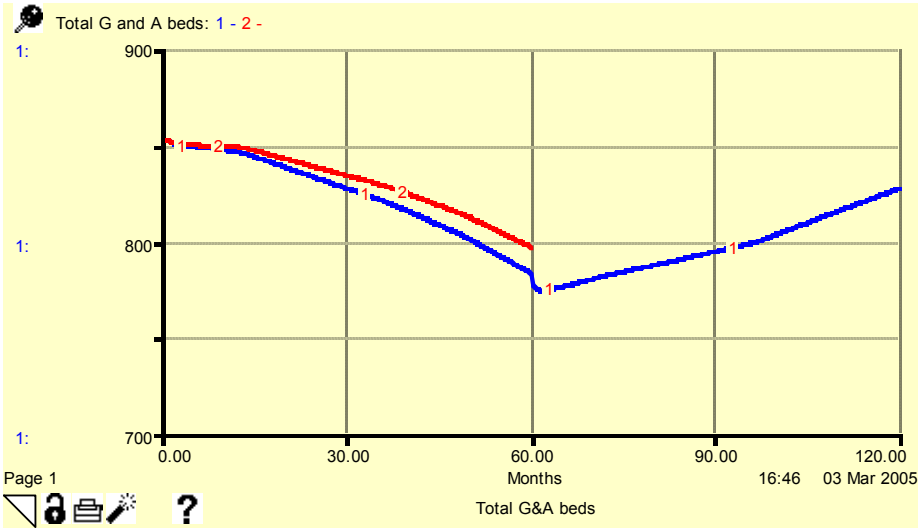

Figure 4 Number of hospital beds required over 10 year period if performance targets are met at the mid-point (line 1) with sensitivity to one key target (line 2 – see text above)

The other factor illustrated in the baseline scenario (profile 1) is that unless continued progress is made in diversion, early discharge and ongoing shifts between secondary and primary care the progress made up to 2007/08 will be largely 'undone' by 2012/13 as a consequence of demographic pressures – the only element left operating in the baseline scenario to 2012/13.

The model has also been used to compare workforce projections. The table below illustrates the initial outputs. Some caution should be taken when using these

outputs in view of the fact that the growth projections may contain some initial filling of vacancies rather than actual growth. However, it is clear that whilst growth in the community sector is anticipated the largest increases are projected for the acute sector, where the simulator outputs suggest this is not justifiable.

	Projections	Simulator outputs
Consultants	+28%	+4% (Level 9 hospital)
GPs	+7%	+1% (Level 9 community staff)
Acute nursing	+17%	-5% (Level 5&6 hospital staff)
Health visitors	+5%	+14% (Level 5&6 community staff)
District nurses	+18%	

6 Learning and benefits

6.1 Specific learning

Outputs from the modelling that will now inform the strategic planning and performance management of the Strategic Health Authority include:

- The need to challenge Primary Care Trusts to review and raise their expectations in terms of intermediate care capacity;
- The need to emphasise the importance of, and monitor changes in, hospital lengths of stay as a key lever to achieving capacity projections;
- The need to challenge workforce plans that have not achieved an appropriate balance between hospital and community workforce projections.

In addition, the Strategic Health Authority has used the tool to facilitate debate between local partners (Primary Care Trusts and Acute Hospital Trusts) and through this to generate new scenarios that are understood and owned by local participants. This has proved invaluable in developing a joint understanding and context for their planning.

6.2 General benefits

Whilst the simulator tool has provided a more quantified appreciation of the whole system and its behaviour key outcomes from the project have also reflected the importance of other, more qualitative benefits, namely:

1. The value of the modelling process in facilitating a learning environment that can constantly challenge how we see the health system evolving, or being transformed over time, and the benefits of sharing this learning process more widely;
2. The importance of identifying key areas where performance is dependant on changes in behaviour and therefore where the role of the SHA and commissioning processes will be to facilitate and enable change;

3. The opportunity to use the Simulator tool to challenge people's language and perception of the system within its traditional boundaries and pathways;
4. The uncertainty of the future – however helpful a Simulator tool is in scoping the potential impact there will always be significant additional 'intelligence' about possible futures that will remain unquantifiable and will rely on expert judgement and political will to understand and effect necessary changes.

The Strategic Health Authority is currently undertaking a wide ranging communications exercise to engage with people across the service in exploring and developing the understanding of the system of care expressed in the Simulator tool. The tool has potential for development and wider application as well as providing an environment in which potentially radical alternative scenarios can be developed, such as the 'sea change' that could be realised as and when technological advances are truly embedded in our homes and communities. Other more focussed applications have also been developed for adult mental health services and the model has been used to inform overall capacity projections for the Trauma and Orthopaedic hospital specialty.

The simulator tool reflects the health system across Shropshire and Staffordshire as understood by participants in the project. As such it is specific to location and to the understanding of this group of people. However, on the basis that participation has been well informed and that the health service we work in is 'national' and therefore reflects similar structures and is subject to the same drivers for performance, the tool does have the potential to inform strategic decisions elsewhere in the UK.