Reallocating Mental Health Resources in the Borough of Lambeth, London, UK

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Abstract

This paper describes the application of system dynamics to assist decision making in the reallocation of resources within a specialist mental health trust in south London. Mental health service providers are under increasing pressure to both reduce their own costs and to move resources upstream in mental health patient pathways to facilitate treating more people, whilst not compromising service quality. The investigation focuses on the use of the model to examine the case for converting an existing specialist service ward in a mental health hospital into a 'triage' ward, where patients are assessed and prioritised during a short stay for either discharge or onward admission to a normal ward. Various policies for the transition are studied together with the implications for those patients needing post hospital services and relocation within the community. The model suggests that the introduction of a triage ward could meet the strategic requirement of a 10% shift away from institutional care and into community services. The paper includes a number of statements from the management team involved on the benefits of system dynamics to their thinking.

Please note that any views or opinions expressed are solely those of the author and do not necessarily represent those of the Lambeth Mental Health Services, the South London and Maudsley NHS Foundation Trust or Lambeth Borough Council.

Key words: system dynamics, mental health, policy, triage, institutional care, cost benefit, impact of process.

Introduction

System Dynamics is being used extensively by the authors to assist decision making and integration of policy implementation along long patient flows crossing multiple agency boundaries. The work has involved national level studies to influence government policy on delayed hospital discharges (Wolstenholme et al, 2004a) and more recently to assist local heath and social care communities in the UK to interpret and apply national policy frameworks for older people (Wolstenholme et al, 2004 b and c) and for mental health reform (Wolstenholme, et al 2006).

This paper describes an application to assist the reallocation of resources within a specialist mental health trust in south London. Mental health service providers in the UK are under increasing internal and external reform pressure to reduce costs and to move resources upstream in mental health patient pathways (Hirsch et al, 2005), to facilitate treating more people, whilst not compromising service quality. The model developed is capable of being used to investigate a wide range of issues along the patient pathway.

The investigation focuses on the use of the model to directly influence hospital admissions by converting an existing specialist service ward in a mental health hospital into a 'triage' ward (Inglis and Baggaley, 2005), where patients are assessed and prioritised during a short stay for either discharge or onward admission to a normal ward. Various policies for the transition are studied together with the implications for those patients needing post hospital services and relocation within the community.

Mental health and the Provision for its treatment in Lambeth

Lambeth Borough is a Local Government Borough in South London, which has a diverse population with a high turnover and significant mental health problems. Mental health services are currently commissioned (bought) on behalf of the borough by Lambeth Primary Care Trust (PCT). The trust supplies the community based treatments itself, but purchases specialist services from South London and Maudsley NHS Foundation Trust (SLAM). SLAM has a full range of institutional services at various levels of security.

The Borough has a clear Mental Health Commissioning Strategy 2005 – 2008 which states that people want to move away from dependence to independence. There is common acceptance of the need to address the holistic needs of people with mental health needs. Indeed many Mental Health Trusts (including SLAM) are at the forefront of this work driving links with Housing, access to employment, vocational services, education etc. The Social Inclusion agenda has highlighted the importance of access to everyday / mainstream activities and the extent of inequality experienced by people with mental health problems.

Therefore the broad strategic aims of the joint strategy and commissioning plan based on the following three pillars:

Promoting Inclusion and well being
Promotion of choice and control
Personalised care and support

The main problems encountered by SLAM are increasing costs due to increasing demand for mental health hospital beds and numerous policies have been implemented over recent years to combat this trend. These have largely taken the form of setting up more and more specialist teams of staff to try to reduce hospital admission, reduce delays in hospital discharge, increase crisis resolution (one of the main reasons for admission) in the community, to help people more comprehensively in the community by assertive outreach and to provide more 'supported' housing to keep people at home. However, the teams have worked very autonomously and with only limited results.

The cost increases in SLAM have also come at a time when national reform of mental health services is gaining momentum. The National Institute for Clinical Excellence (NICE, 2004) has issued guidelines for a stepped care approach to mental health. These guidelines specify clinically-proven, best-practice pathways to care via a series of steps, which recognise patient choice and preference and service efficiency. The main aim of a stepped care approach is to simplify the patient pathways, provide access to more patients and to improve patient well-being and cost reduction by directing patient referrals, where appropriate, to low cost community based treatments before high cost institutional or specialist services. There is also a national move to implement payment by results rather than block purchase of mental health services.

The Project and the Aims

Faced with increasing cost escalation and a need to implement more effective community projects, the PCT and the MHT, in partnership with Symmetric SD Ltd, commissioned a project to take a more systemic view of patient flows through the mental health system in Lambeth. The idea was to develop a mental health-commissioning model using system dynamics in order to reflect the real behaviour of the whole system environment of mental health services.

A system dynamics model was built under the guidance of an expert project group comprising managers and clinicians from the agencies involved and run on the ***Ithink*** software. This model captured the movement of service users through the main elements of the "whole system" of services.

The main purpose of the model was to enable the project group to gain a better understanding of the behaviour of the whole system. By representing the complexity arising from the different rates of movement (flows) through and between each service domain, the model could enable the group to envisage the possible impact of various changes in policy. For example, changing the balance of service capacities, changing the main assumptions governing patterns of movement through various service pathways, such as assumptions about lengths of stay, or the proportions of service users that will need to be discharged to other services.

The primary focus of the work was to model various commissioning (purchasing) strategies (which have been directly informed by user and carer consultation) aimed at achieving a shift of 10% from institutional care to services which supported independence and recovery and ideally within a community setting. Further, to evaluate the impact of these potential service change scenarios across the whole mental health economy e.g. admission avoidance services; increase in crisis resolution; increase in community support packages; increase in supported housing; increase in assertive outreach.

A secondary aim was to model demand and capacity assumptions which could help inform future service activity based and a payment-by-results framework for commissioning and provision.

A tertiary aim was to undertake best value evaluation of institutional care using the attached framework including detailed benchmarking with other economies (via whole life programme/fast track programme) and adjacent boroughs.

The work reported here concerns the use of the model to test policies for reducing delayed discharges from SLAM. The Adult Mental Health Services in Lambeth have a number of delayed discharges at any one time (average 26) and the service is keen

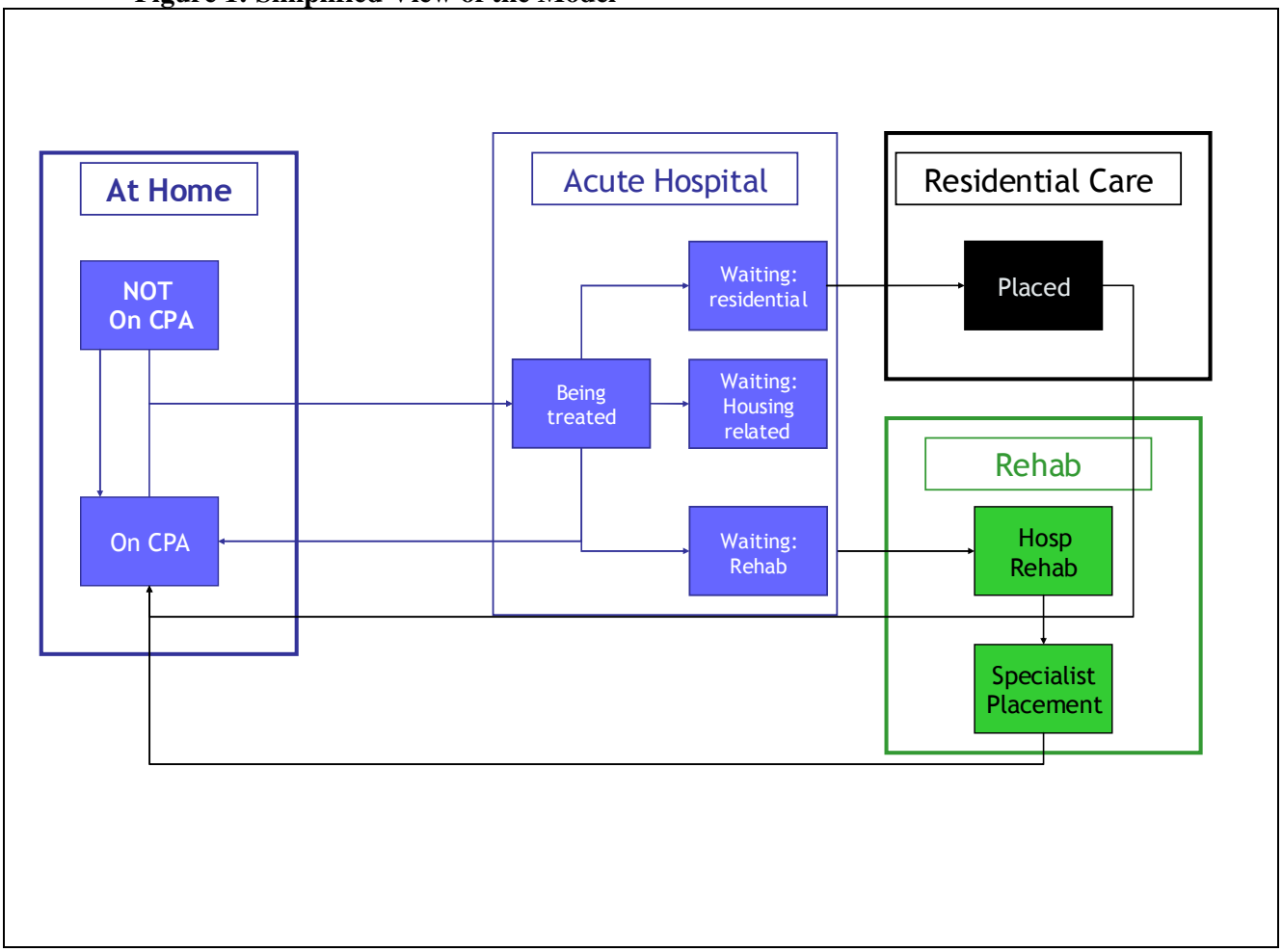
to find long term solutions to eliminate this problem which mean that patients do not need to be in hospital for long periods of time.

In particular, the service was looking at developing a business case to relocate an adult acute ward on a general hospital site to the Lambeth Hospital site with the view to introducing Triage as a model for this ward. Work undertaken in nearby Lewisham suggested that they were discharging 50% of all their patients admitted using this model were discharged within 7 days. Clearly unblocking the delayed discharges and increasing throughput within SLAM services could make it possible to close an in-patient ward and re-invest in community services in line with the overall strategy.

The structure of the model

Figure 1 presents a simplified view of the model.

Figure 1: Simplified View of the Model



The model represents the population of people having severe mental health problems in this borough. The majority are living at home, divided between those who are known to services and hence on a 'Care Programme Approach' (CPA), and those not yet known.

People in either of these groups may become ill and require an acute hospital stay. Following treatment, the majority are discharged home (now on the CPA), but some will require further assessment and care, including those being considered for residential care, those delayed because of a variety of housing-related problems, and those requiring a transfer to hospital rehabilitation.

From residential care, some are discharged home.

The rehabilitation domain is characterised by lengthy initial assessment & referral procedures and long treatment times, leading to possible discharge to specialist placements, before an eventual return to mainstream housing for some.

The initial focus of the project was to test scenarios involving a reduction in reliance on institutional care. As the project progressed, there became more of an emphasis on acute admission avoidance and triage (a process of assessment and prioritisation). To test these scenarios, some additional components were added to the model, representing new pathways that could be switched on or off. These are shown in Figure 2.

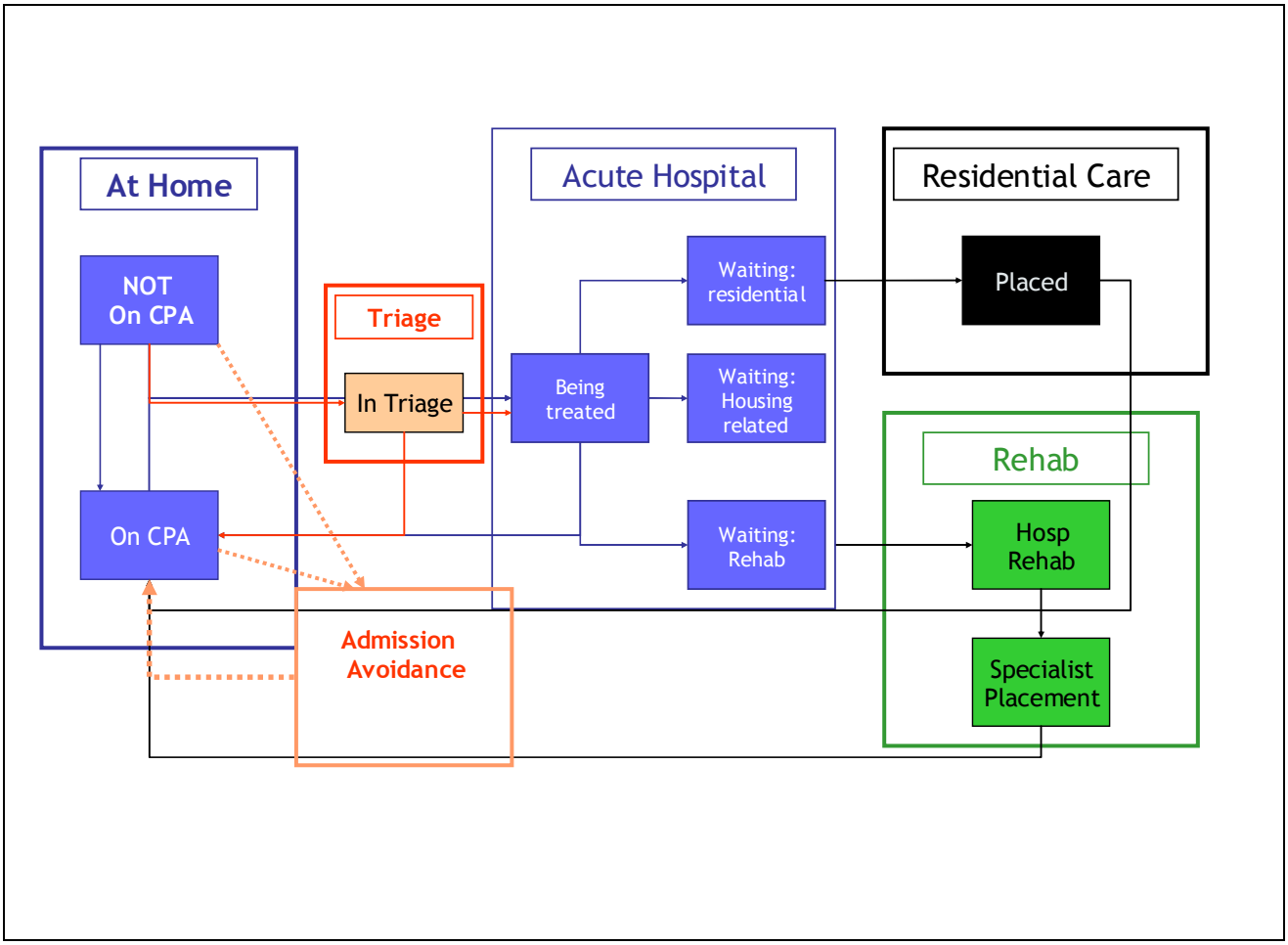


Figure 2: The Model including Triage and Admission Avoidance

If Triage is switched on, all acute admissions go first to a triage bed (for the purposes of the model, it is not important to know whether this represents beds within a particular ward, only how many triage places there are). A substantial proportion of

patients are discharged home within 7 days, and the remainder proceed to the normal acute admission route. In the event that acute beds are full, patients would remain in a triage bed for longer than 7 days pending transfer.

Similarly, with Admission Avoidance (in the form of intensive outpatients or home treatment team), service users who otherwise would have required admission are diverted to these services, for a given length of stay, following which a proportion might still require admission.

Model Data

For each of the main service domains, the model requires similar data inputs, the main ones being:-

The mean length of stay of those using this service

The percentage who will require to be transferred to each kind of further service (or home) on completion of this service

The capacity of the service (in terms of the total number of people who could use it at any time; note that for acute hospital beds, the capacity might be greater than the number of beds because some are boarded out)

For people at home, the model inputs concern the rate at which they become unwell and at risk of acute admission.

The main model input devices are designed to enable a model user to vary their assumptions about any of the above input variables in the course of a model run (which in this case spans five years broken down into days), and observe the impact on the whole system.

Data Problems

Some problems were encountered in the collection of detailed data. This was especially true of acute hospital data on lengths of stay and the percentage breakdowns of discharged destinations. The model inputs differentiate between that part of the length of stay that is "required" as a part of treatment, and the part that results from patients being delayed whilst awaiting assessment and / or placement in onward care. Because of the dynamic nature of the model, lengths of stay in acute beds are sensitive to throughput in other sectors, such as residential care or hospital rehabilitation, and so on. In these cases separate exercises were established to estimate the parameters and, interestingly one benefit of the model turned out to be its ability to identify where there were omissions in the data collected for operational management

Model Use

The model was used for a wide range of analysis. However, the focus of the presentation here will relate to exploring the possible impact of introducing triage capacity, whilst withdrawing acute capacity in order to better control hospital admissions.

Assumptions about hospital discharge

The model has been populated with data from a variety of sources. Some of the main assumptions underpinning the model run shown in this section cover discharge rates of those admitted to acute beds.

Table: Discharge Outcomes from Hospital

Percentage of those admitted referred to the residential placement panel	8%
Percentage of those to place in residential	60%
Percentage of those to place in rehab	5%
Percentage of those with mainly housing-related need	10%
Remainder to go home without further assessment	25%
Percentage with other housing need (not routed via placement panel)	20%
Percentage referred to rehab (not routed via placement panel)	6%
Remainder go home without further assessment	66%

Assumptions about Triage

The main assumption made about Triage was that the service can discharge 35% of all acute admissions within 7 days. The remaining 65% would be admitted to an acute bed. This presupposes, among other things, that swift involvement of an existing (or immediate allocation to a new) care co-ordinator can be achieved.

In the course of running the model, the group had to make further assumptions about the profile of those admitted to acute beds under these circumstances. There are three assumptions:-

Optimistic: that the 35% that are discharged would have had the same discharge outcomes as in the Table above, had they been admitted

Pessimistic: that the 35% that are discharged would all have been in the "go home without further assessment" category, meaning that the discharge percentages listed above would have to be increased accordingly

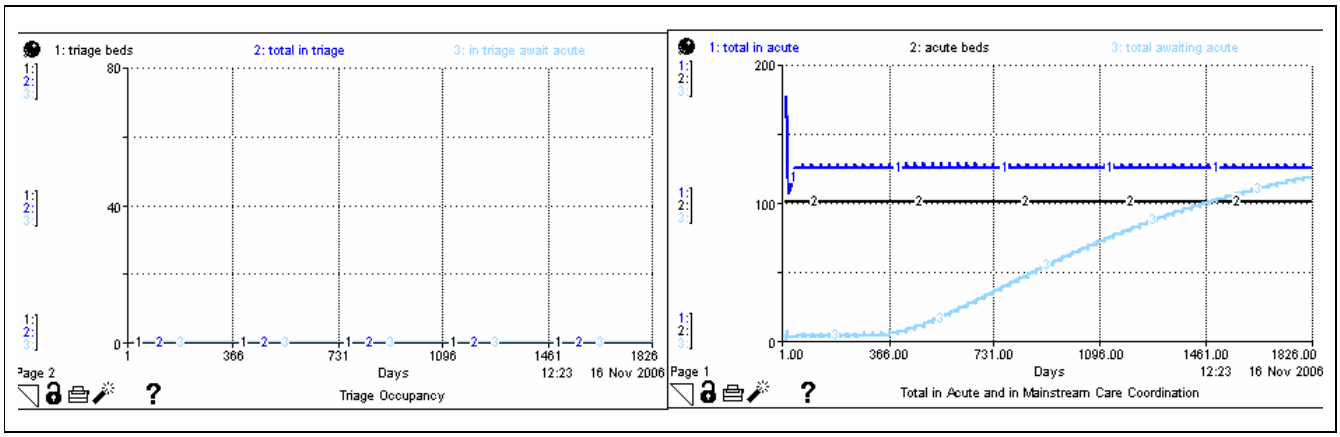
Mixed: that the 35% that are discharged would be mid-way between these Optimistic and Pessimistic

Of course, there is no empirical way of knowing which assumption to make. It seems very likely that the profile of those admitted following Triage will be different than those admitted without Triage. Perhaps a better taxonomy might be Very Optimistic, Optimistic, and Realistic instead of Optimistic, Mixed, and Pessimistic.

Running the Model

Base Run – What Happens if We Continue As Is?

The purpose of the base run is simply to show how the system will behave over a five year period, if no change is made to bed capacity.



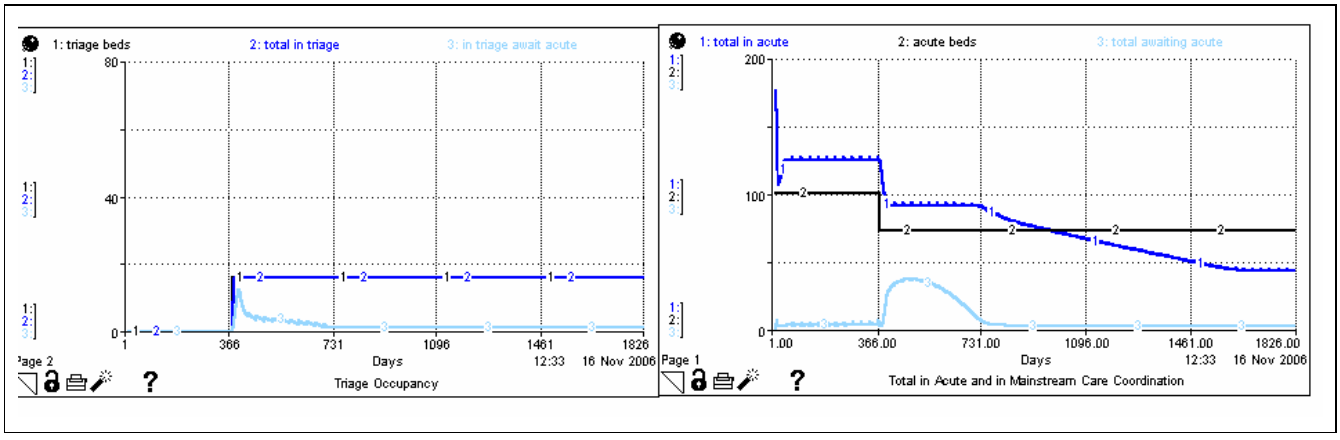
The right-hand graph shows the number of acute beds. Note that the number of patients in acute reflects a policy of allowing a maximum of 125% bed-occupancy (taking into account that a number of patients can be boarded-out). So there are more patients than beds. The uneven pattern of the "total in acute" line results from the monthly cycle of residential placement patterns, which means that discharges (and hence admissions, when the acute sector is full) are unevenly distributed across days of the month.

Line 3 of the right hand graph shows a virtual "waiting list". This would emerge if no other action was taken to correct the situation. Presumably, if such a waiting list became a reality the agencies responsible for running the whole system would find ad hoc ways of dealing with this. One should not interpret this as the model "predicting" that there will be a waiting list for acute admission gradually building up over the next five years.

The left hand graph merely shows that there are no triage beds.

Run 1: Introduce 16 Triage Beds, and Reduce Acute Beds by 27 using Optimistic Assumption

In this experiment, after one year a triage capacity of 16 beds is introduced and hospital beds are reduced by 27. Also the optimistic assumption about discharge percentages is used.



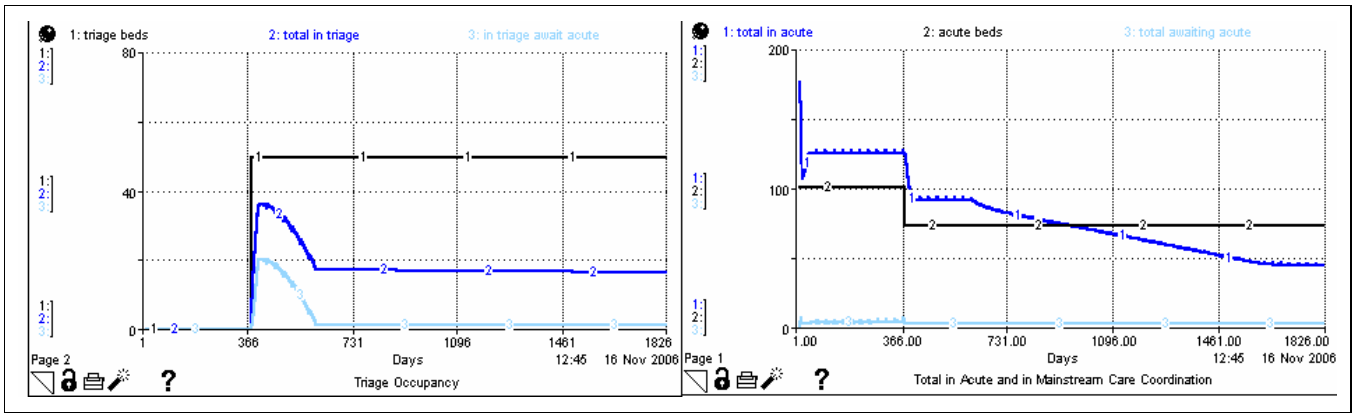
This result indicates that even with the most optimistic assumptions about the profile of patients admitted from Triage, to reduce acute beds by 27 in one step will lead to a

"waiting list" occurring in year 2. Once it clears, during the first quarter of year 3, the system appears to cope, and indeed acute occupancy reaches a new equilibrium state by the middle of year 5, of about two thirds bed occupancy.

Note also that in the left-hand graph of triage, the "triage beds" and "total in triage beds" lines merge into one because beds are always full,. The line 3 in that graph shows the number of people who are occupying a triage bed but are beyond the 7 day limit, and awaiting transfer to an acute bed. Not surprisingly, that phenomenon only occurs to any significant extent during year 2, when acute beds are full. The level of that variable from years 3 onwards merely shows that people are moving through triage into acute.

In passing, the model can also be used to give an indication of the number of triage beds that ideally would be needed, all other things being equal. By allocating an unusually large capacity, the capacity constraint is effectively relaxed and occupancy allowed to find its own level. So instead of opening triage with 16 beds, 50 beds are allocated.

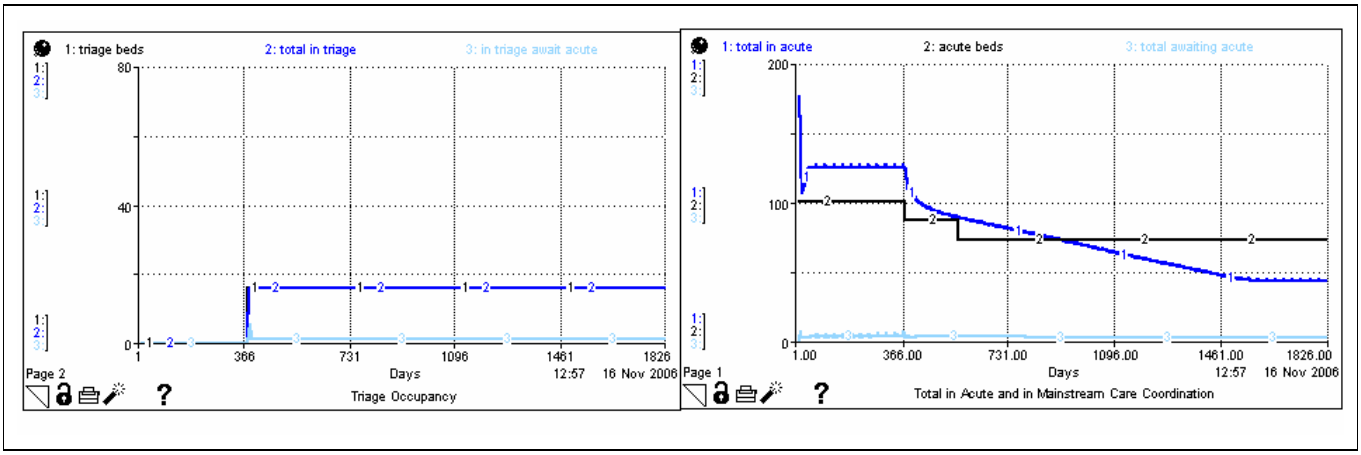
Run 1a: Giving Triage More Than Enough Capacity to Investigate how much is "Really" Needed



Note that for the first year of triage, there is a significant influx of people, but that is because acute beds are still blocked and people are waiting in triage. More than half of those in triage at this stage have completed their 7 days and are awaiting an acute bed. Once acute beds clear, in year 3, the number in triage settles down to 17, which is very close to the figure of 16. This was the number intended to be allocated.

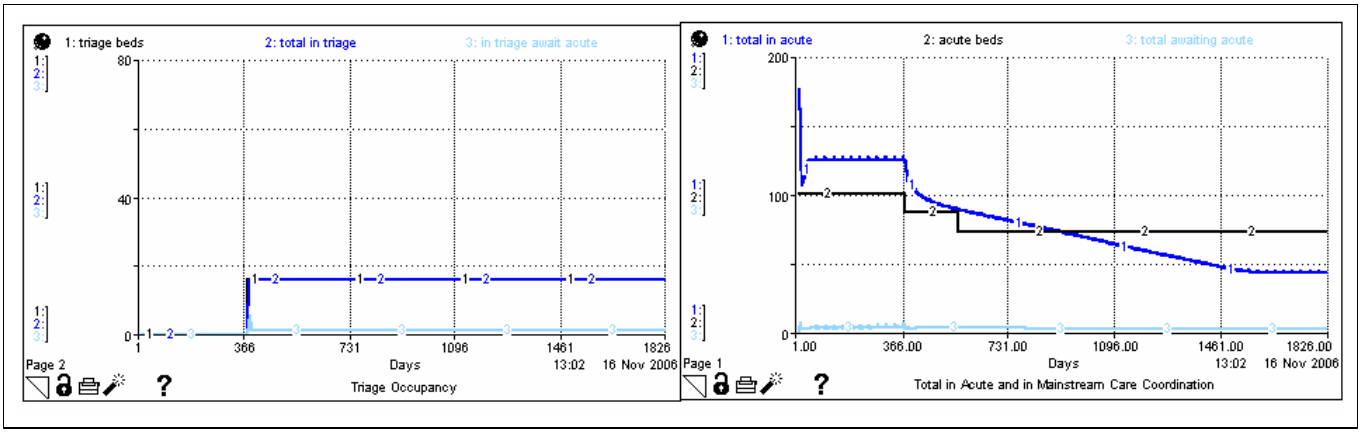
Going back to Run 1, then, it might be considered sensible to phase the acute bed reduction, still using the Optimistic assumption. Instead of taking out 27 beds in one go, run 1c takes out 13 beds when triage is introduced, and takes out a further 14 beds after another 6 months.

Run 1b: Withdrawing acute capacity in two stages



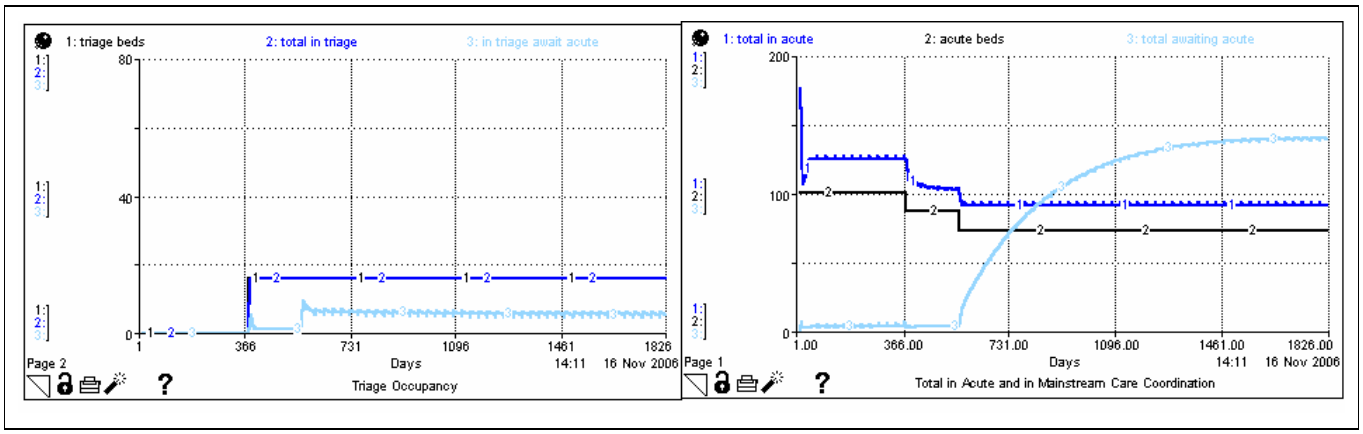
This phasing appeared to be beneficial, so for the remaining runs, which model the Pessimistic and Mixed scenarios, using the same strategy of withdrawing acute beds will be assumed to be implemented in two stages.

Run 2: Introduce 16 Triage Beds, and Reduce Acute Beds by 27 (in two stages) using Mixed Assumption



This experiment gives a virtually identical picture to the Optimistic scenario. Even although the profile of those admitted is that they are more in need of onward care (precipitating more assessment / awaiting resource delays) it would appear that the other parts of the whole system (mainly those dealing with assessment and placement) are able to cope with this level of demand.

Run 3: Introduce 16 Triage Beds, and Reduce Acute Beds by 27 (in two stages) using Pessimistic Assumption

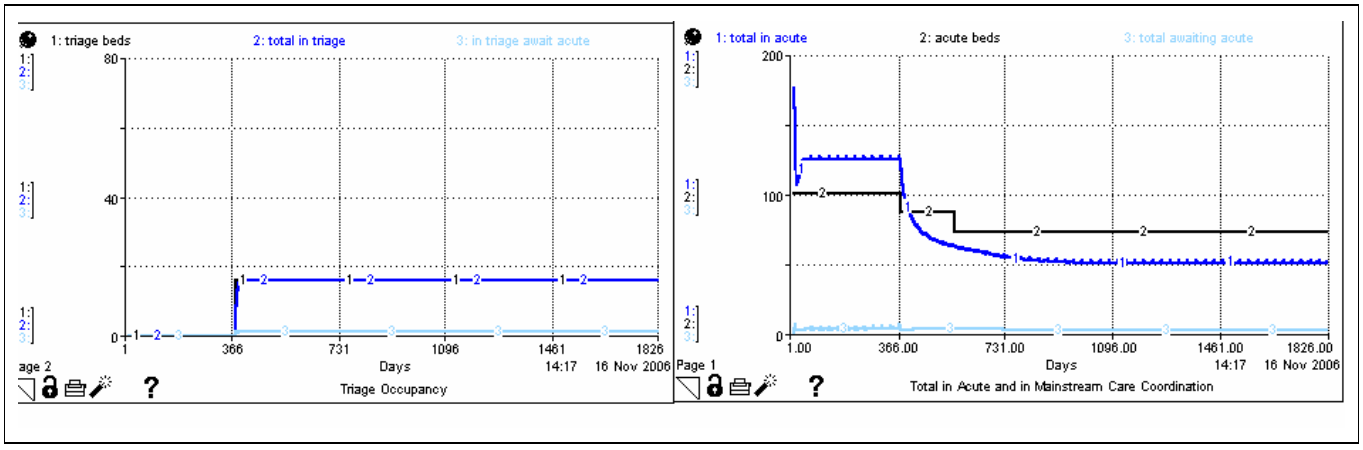


This experiment shows that if the only patients discharged from triage after 7 days are those that have no onward care needs, the system will probably not cope with such a large transfer of resources out of the acute sector.

However, it must be borne in mind that the reason for the high occupancy of acute beds under this scenario results from the hospital population now being made up mainly of "delayed discharges". The appropriate solution to this problem might well not lie within the hospital sector but in the post acute sector.

Indeed, by running this scenario again, and adding an additional 10 residential placements to the system, the result is quite different, and gives an indication of the need to work closely with the housing agencies to ensure hospital discharge facilities are in place.

Run 3a: Introduce 16 Triage Beds, and Reduce Acute Beds by 27 (in two stages) using Pessimistic Assumption, whilst adding an additional 10 residential placements



Management reaction to the study

Lambeth PCT who commission (buy) mental health services from SLAM have used system dynamics in a number of studies. However, this project was the first time SLAM had applied the method. The usual approach to service improvement at SLAM was to undertake periodic reviews overseen by project boards with representation

from a range of disciplines. Each of the steering groups collected data which they analysed themselves and once the trends had been agreed with the Project Board then the detailed work of practical implementation began.

The management team at SLAM was impressed by the way the approach complemented existing team work, allowed the service to test out thinking and assumptions on future service delivery in a safe environment and the way it accelerated communication and decision making.

In particular, Patrick Gillespie the Director of SLAM responsible for Lambeth Adult Integrated Mental Health Services commented:

> "The visual representation of the whole system in system dynamics enabled greater ability to problem solve – to see how one part of the system impacts on the other. Specifically, to see how both admissions and discharge are significant to the 'whole system' working well."
>
> "We must have the ability to move whole system resources to where they are most needed impacting on quality of care and efficiency of provision. We need to break down the 'service and/or team silo' approach and be able to move staff skills to where the need is i.e. discharge planning – care coordinator, housing input, substance misuse. Effectiveness of whole system will be greatly improved if we can get the 'right skills, in the right place, and at the right time'; provision will therefore be truly 'needs led' and not 'provider led'"
>
> "The dissecting of data to get the true picture is of the up most significance. By digging around in length of stay data and looking at different cohort groups we got a better understanding of what is really going on and therefore the possible solutions."
>
> "The model emphasised the key role community service provision plays in allowing users to 'move through' the system. Without effective discharge planning, move-on options, and available housing stock it doesn't matter what we do at the point of admission; it will have little impact on the whole system."
>
> "Mental Health service providers like SLAM must work closely with service commissioners and the system dynamics approach enables a level of inquiry and examination of organisational challenges faced when testing new commissioning decisions. I am keen to learn such new approaches."

Conclusions

A system dynamics model was developed to investigate the effects and phasing of policies aimed at reducing costs in a specialist mental health hospital. System dynamics proved an excellent tool for this purpose both to communicate the issues and solutions to the project team and to gain implementation momentum across the numerous agencies involved. The model is capable of exploring a wide range of scenarios, but has been used here to demonstrate the effects of making changes around the hospital admission arrangements.

The results suggest that the Mental Health Trust can achieve a 10% shift away from institutional care by implementing the introduction of a triage ward. The model outputs show that benefits which will accrue, but the extent of these crucially depends on the nature of the population that is still admitted to the hospital sector.

The model also strongly indicates that if 16 triage beds are created, but acute beds are reduced by 27, this reduction would almost certainly need to be phased. Furthermore, if the only people who are discharged home from triage are those who would have had no onward care (potential delayed discharge) needs, the pressure on acute beds will remain. But at this point, further consideration needs to be given to the capacity requirements of the post-acute sector.

The management team were impressed by the study and are keen use the model further to look at unblocking the Rehabilitation Wards in SLAM, supported accommodation and housing.

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