

Moving on?

A handbook on modelling the whole system for
delayed discharges in Tayside

Prepared for the Auditor General for Scotland and the Accounts Commission

June 2005



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Audit Scotland prepared this report on behalf of the Auditor General for Scotland and the Accounts Commission.

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Acknowledgements

Audit Scotland gratefully acknowledges the work and commitment of members of the Tayside Partnership who gave a great deal of time and effort to help us develop the model. Particular thanks go to Bruce Dickie, Jane Davidson and John McKenna (NHS Tayside) for their help and support throughout the project; and also to Jenni Douglas and Jenny Bodie (NHS Tayside), Diane McCulloch (Dundee City Council), Liz Brown (Perth & Kinross Council) and Ann Mollison (Angus Council) who contributed greatly to the development of the model and the data collection process.

We are also very grateful to the Whole Systems Partnership, in particular to Peter Lacey for his support and guidance throughout the project.

Finally, thanks to Ron Smith, Andy Carver and Steve Kendrick at ISD Scotland and to our project advisory group (named in the main report) who provided invaluable support.

The project was managed by Mark Diffley with support from Catherine Vallely, under the general direction of Angela Canning.

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Part 1. Introduction

Aim of handbook

1. During 2004 Audit Scotland led a project with the Tayside Partnership and ISD to develop a whole systems model for Tayside to help tackle its delayed discharges from hospital (see paragraph 6).^{1 2}
The aim of this handbook is to share our approach with Scotland's NHS and council partnerships wishing to develop their own whole systems thinking.
2. The model developed for Tayside is not a 'one size fits all' solution which can be used by other partnerships across Scotland. It is a model for Tayside – developed with Tayside staff, comprising local understanding of how the Tayside system works, using local data and considering local strategies put forward by Tayside. Other partnerships might benefit from the work undertaken in Tayside when tackling delayed discharges, as well as in wider planning and service development across their localities. Our approach is outlined in the rest of this handbook.
3. The Tayside model does not provide a solution to the problem of delayed discharges in Tayside. It is an interactive tool to inform and help planning and decision-making in relation to delayed discharges. If successful, Tayside may also explore how it can develop its whole systems thinking to tackle other issues.
4. The modelling work in Tayside was carried out alongside Audit Scotland's overview of delayed discharges in Scotland.³

Taking a whole systems approach

5. It has been apparent for a number of years that public provision of health, social care and housing support services cannot operate in isolation. Changes in the approach to service delivery in one of these areas often have significant implications for the others working within the same system. The fact that these services are delivered by different providers within the same geographical area adds to the complexity.

¹ The Tayside Partnership comprises NHS Tayside and Angus, Dundee City and Perth & Kinross Councils.

² Information Services Division of NHS National Services Scotland (ISD).

³ *Moving on? An overview of delayed discharges in Scotland*, Audit Scotland 2005.



6. Taking a whole systems approach is about gathering local intelligence to understand the impact of changes in one part of the system on everything else.⁴ A shared understanding of how the whole system works can then help partners to plan how to deliver services and use resources to make sure that people get the services they need, delivered to a high quality and in a sustainable way.
7. Specifically, an effective whole systems approach has the following characteristics:⁵
 - Services are responsive to the needs of the individual patient, user or carer.
 - Those using the system do not experience any gaps or duplication in provision.
 - All stakeholders accept their inter-dependency and the fact that the action of any one of them may have an impact on the whole system.
 - There is agreement between stakeholders as to the vision of the service, the priorities, the roles and responsibilities, the resources, the risks and the review mechanisms.
 - Relationships and partnerships are enhanced.
8. In Scotland, NHS boards and their council partners are increasingly aware of the need to take a whole system approach to support service development, planning and delivery within their localities. One of the many issues that local partnerships are working on together is tackling delayed discharges from hospital.

Delays leaving hospital can occur when the necessary ongoing care, support or accommodation is not ready

9. Most patients discharged from Scottish hospitals are dealt with promptly. Delays can occur when a patient is clinically ready for discharge but cannot leave hospital as the necessary care, support or accommodation they need is not ready. This situation is commonly called a delayed discharge.
10. As well as affecting delayed patients and their families, delays in discharging patients can lead to cancelled operations and increase the length of time that other patients wait for hospital treatment.

⁴ www.thewholesystem.co.uk

⁵ *Discharge from hospital; pathway, process and practice*, Department of Health, 2003.



Our study

11. There were two elements of our study:
 - whole systems modelling in the Tayside Partnership
 - an overview of delayed discharges across Scotland.

Whole systems modelling in Tayside

12. Audit Scotland is in the unique position of auditing the whole of the public sector in Scotland, and is increasingly undertaking performance audits which cut across more than one area of the public sector.⁶ We are committed to improving our understanding of how local health and social care systems can work together to provide better services for their local population.
13. During 2004 we developed a project to build an interactive whole systems model in one NHS board area, focussing on how its health and social care partners can tackle delayed discharges. Developing a whole systems model can be a huge task, and there is danger that the work can lose focus and the eventual model becomes unwieldy and unusable. To avoid this, we decided to work with a partnership covering one NHS board area, and to focus on older people, as people aged 65 and over make up almost 90% of those patients whose discharge is delayed.⁷ We developed criteria to help select one of the 15 delayed discharge partnerships across Scotland.⁸ The Tayside Partnership was the best fit for these criteria. ISD was also represented on the project team.⁹
14. The aim of our whole systems modelling work in Tayside was:
to model the whole system within one NHS board area with a view to tackling the local problems being experienced with delayed discharges for older people.

⁶ For example, *Adapting to the future. Management of community equipment and adaptations*, Audit Scotland, 2004.

⁷ ISD census data, January 2005.

⁸ Selection criteria were: coterminous boundary: more than one council partner; problem with delayed discharges; willing to participate in the project; robust data available and manageable (i.e. not too many partners).

⁹ ISD has undertaken work aimed at understanding how health and social care operates as a whole system. Further information on its Whole System Project is at www.isdscotland.gov.uk



Overview of delayed discharges

15. Alongside the whole systems modelling work in Tayside, Audit Scotland carried out a high-level review of delayed discharges across Scotland. This involved analysing national data, and interviews with delayed discharge managers and teams in partnerships, and with the Scottish Executive Health Department (SEHD). Our findings are reported in *Moving on? An overview of delayed discharges in Scotland*.

Methodology for whole systems modelling in Tayside

Learning and sharing experience

16. Our approach consisted of five events involving stakeholders from all parts of the Tayside Partnership (see Part 2). These events were essential for exploring the local system and for developing local ownership of the whole systems model. This approach enabled us to:
 - work closely with the Tayside Partnership to get a shared understanding of its local health and social care system
 - support joint working across the Tayside Partnership through facilitating discussion about planning and developing services for older people
 - enhance the partnership's understanding of how its system works and reasons for delayed discharges.
17. A series of newsletters were disseminated during the project to keep stakeholders in Tayside and other interested parties up to date with how the work was developing.¹⁰

Developing an interactive model

18. In parallel with the stakeholder events, a small modelling group took the outputs from the stakeholder events and translated them into a model using *ithink* software. This group included representatives from the Tayside Partnership, Audit Scotland and ISD.¹¹

¹⁰ The newsletters can be viewed at www.audit-scotland.gov.uk/publications/newsletter.htm

¹¹ The Whole Systems Partnership facilitated the modelling sessions and provided support to the modelling group throughout the project. It also provided training in the *ithink* software.

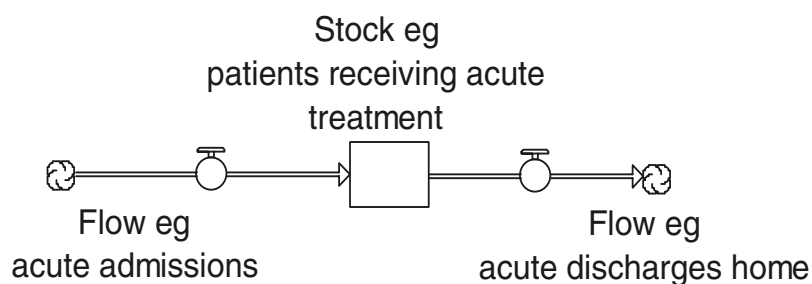


19. The *ithink* modelling software uses a 'stocks and flows' approach (exhibit 1). These stocks and flows have been likened to filling and emptying a bathtub. The bathtub represents the 'stock' of water which can rise or fall due to the 'flow' of water coming in from the taps or released through the plug. In exhibit 1, the stock is the number of patients being treated in hospital with flows in (admissions) and flows out (discharges).
20. Looking at a model of stocks and flows allows users to examine the impact of changes in one part of the system on the whole system.

Exhibit 1

Example of a simple stock and flow structure in *ithink* software

This illustrates a flow (acute admissions) into a stock (patients receiving treatment) and a flow out (acute discharges home).



Source: Audit Scotland

21. The model developed for Tayside reflects the system in Tayside where delayed discharges occur. It helps to illustrate the impact of different strategies to reduce delays and how they compare with the national target of a 20% year on year reduction in the level of delayed discharges (see Parts 2 and 3). It runs over a four year period and is populated by local data about services and demographic projections.
22. The Tayside whole system model can be viewed online at:
www.audit-scotland.gov.uk/publications/ddischarges.htm
23. Copyright of the model lies with Audit Scotland. Other partnerships might benefit from this work but the model reflects Tayside's system and is not a 'one size fits all' solution.
24. The rest of this handbook sets out the processes used to develop an understanding of Tayside's whole system, and how this was translated into an interactive model aimed at tackling delayed discharges in that locality.



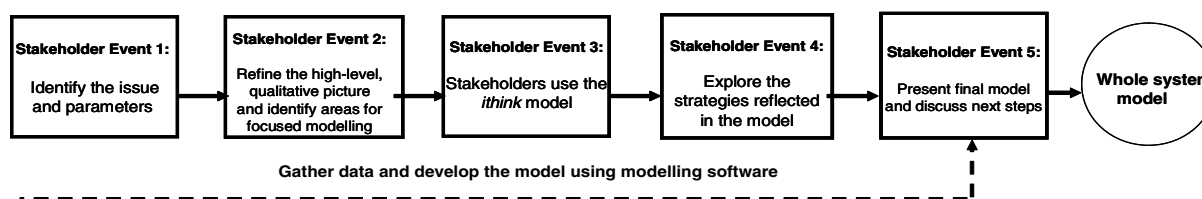
Part 2. Involving stakeholders in building the whole systems model

- Stakeholders work together to understand the local system, identify where the problems are and what the solutions may be.
- Using the interactive model, stakeholders explore the impact that different strategies aimed at reducing delayed discharges may have on the whole system.
- Robust data are needed to populate the whole system model.

25. Getting a common understanding of how the local health and social care system works is crucial to developing a whole systems model that reflects, as far as any model can, the key parts of the system, the system boundaries and how all the various components of the system interact with each other.
26. The Tayside Partnership identified a wide range of relevant stakeholders from different parts of its health and social care system, and we held five stakeholder events in Tayside over nine months in 2004.¹² The events provided a forum to share understanding of how the complex local system works, and ensured that the stakeholders were engaged throughout the modelling process. Exhibit 2 shows the steps involved in developing the model.

Exhibit 2

Developing model in Tayside



Source: Audit Scotland

¹² Staff from NHS Tayside and councils' social work and housing services attended each of the events. Different professions were also represented, including people involved in planning, managing and developing services, as well as frontline staff responsible for service delivery.



Stakeholder Event 1: Identifying the issue and parameters

27. The objectives of the first event were to:

- capture stakeholders' experience of the health and social care system
- explore the key stages in the system that impact on delayed discharge
- establish a practical baseline from which to begin developing the model
- set the parameters of the model in terms of timescale and level of detail.

28. In developing a whole systems model there is a danger that the work can lose focus and the eventual model becomes unwieldy and unusable. Establishing a statement that summarises the key issue the model should address helps avoid this. The main issue for the Tayside Partnership to address through the model was:

What is the best distribution, redesign or development of capacity that minimises the number of patients whose discharge is delayed, and maximises outcomes and value for money?

Understanding the local system

29. During the first stakeholder event, we explored stakeholders' experiences of the key stages in the local care system and discussed what contributes to delayed discharges. These stages were then illustrated in a high-level qualitative map which forms the basis of the model (exhibit 3, overleaf).

30. Stakeholders identified significant factors in the local system that impact on the level of delayed discharges, such as service capacity. They also recognised that factors such as culture or professional behaviour can influence the level of delayed discharges (see oval in exhibit 3, overleaf), but the model does not address these directly as they are difficult to quantify.

31. Stakeholders discussed the expected growth in Tayside's older population and the effect this would have on admission rates and therefore the likely level of delayed discharges. The impact of demography on the model is discussed at paragraph 61.

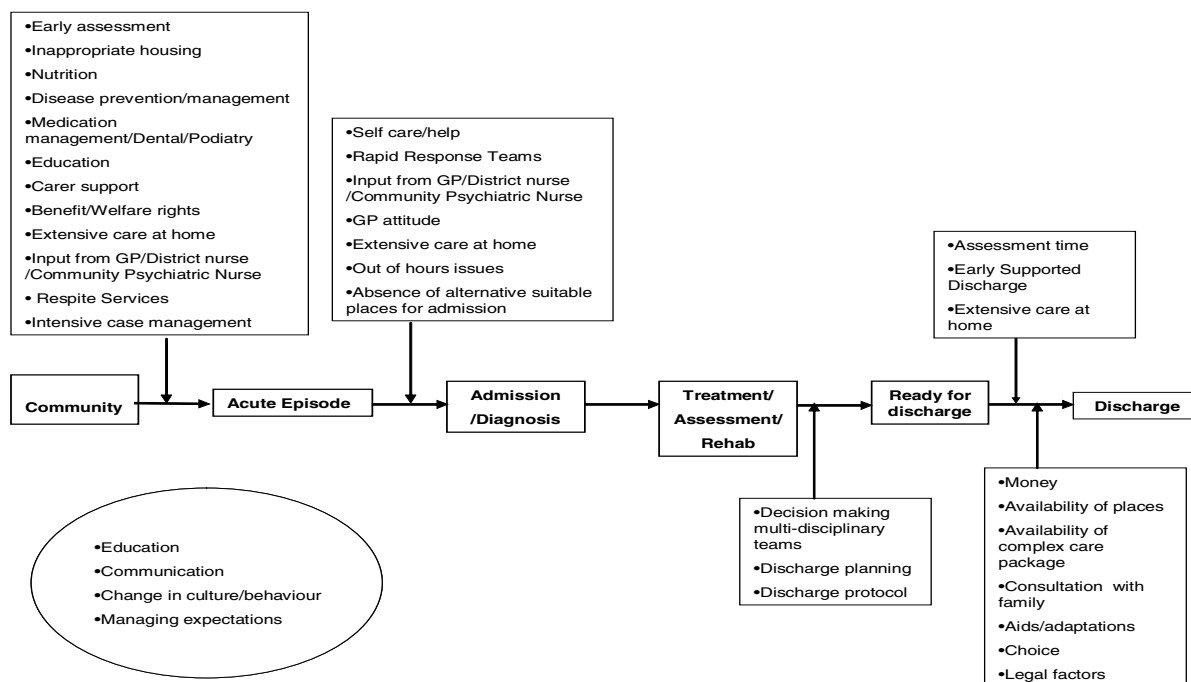
32. Knowing the system boundaries is also important to making sure that the eventual model is manageable. We agreed boundaries for the Tayside model as immediate services, processes or capacity that impact directly on delayed discharges.



Exhibit 3

Mapping a patient's journey through the whole system – factors that could impact on delayed discharges

This shows various factors (in boxes) that may impact on the each stage of the patient or client journey. The oval in the bottom left hand corner contains factors that may impact on all stages of the journey.



Source: Audit Scotland

Modelling work between first and second stakeholder events

33. After the first stakeholder event, the modelling group translated the high-level map of the key stages in the patient journey into an initial *ithink* model made up of stocks and flows.



Stakeholder Event 2: Refining the high-level, qualitative picture and identifying areas for focused modelling

34. The objectives of the second stakeholder event were to:

- make sure stakeholders were content with key issues and working assumptions for the modelling work
- present stakeholders with the outputs from the first event i.e. the high-level, qualitative map of the local system
- build on and refine the high-level, qualitative map
- report on analysis of local data
- identify and agree on areas for more focused modelling.

35. We further developed our understanding of the local system by holding group discussions around the high-level, qualitative map. As this map forms the basis of the model, it was essential that it captured stakeholders' views of the system, and how different parts of the system interact with each other. We presented stakeholders with the analysis of EMPTAYDD data and an overview of Tayside's current approaches to addressing delayed discharges.¹³

36. Through brainstorming sessions, stakeholders identified the following actions to potentially reduce delayed discharges:

- avoiding admission
- speeding up the hospital discharge process
- developing new capacity.

¹³ Electronic Management of patients in Tayside Delayed Discharge system (EMPTAYDD). This is a web based facility that provides secure access for NHS Tayside and Tayside's three councils to a patient specific database, with real time reporting.



Modelling work between second and third event

37. The modelling group continued to develop the *ithink* model after the second event. Exhibit 4 (overleaf) illustrates a simple map of the model's basic structure. The model infrastructure behind this illustration is complex. It reflects Tayside's number of delayed discharges in 2003 and runs through to March 2007, providing monthly outputs.¹⁴ It also shows the impact of different strategies to reduce delayed discharge, comparing them to the 20% year on year target set by the SEHD. The Tayside model is arrayed by geographical area (Angus, Dundee City and Perth & Kinross). It also reflects two stages of delay, for under and over six weeks¹⁵.
38. The model structure provides a spine that reflects the flow of people¹⁶ aged 65 and over from the general population into hospital sectors, through the treatment and rehabilitation process, assessment and discharge planning, and on to the following destinations:
- home without care
 - home with low levels of care
 - home with complex care
 - specialist housing
 - care home.
39. In addition to these destinations, the model also reflects some patients moving from the acute to non-acute hospital sector and also in the opposite direction.¹⁷ Analysis of the EMPTAYDD data identified that these pathways, apart from home without care, have potential for delay.

¹⁴ In the model, the number of delayed discharges at April 2003 was an average of delayed discharges from June 2002 to March 2003.

¹⁵ To reflect the nationally acceptable six week discharge planning period.

¹⁶ Unscheduled admission rates to acute and non acute hospital per 1000 population.

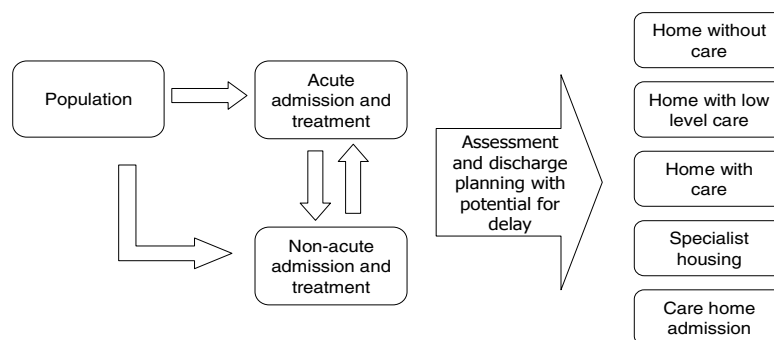
¹⁷ The model also reflects that some patients may die.



Exhibit 4

Patient journey through the system

This is simplified structure of how the patient and client journey through the system is modelled.



Source: Audit Scotland

40. The population component in the model enables us to consider demographic changes that will impact on hospital admissions and therefore on the likelihood of a patient's discharge from hospital being delayed. This component tracks changes in Tayside's over 65 population, arrayed by age band and by geographical area.¹⁸ We did not break these data down by particular groups, such as older people with mental health problems.

Gathering data for the model

41. A whole systems model needs to be based on robust data. Tayside's EMPTAYDD system provided an excellent source of information for the modelling work.^{19 20} This real-time system was developed by Tayside to record details about patients whose discharge from hospital is delayed including their name, ward, length of delay and reason for delay. The system went live in March 2002 so provided two years of data on the numbers, location and destination of patients whose discharge had been delayed.
42. Once the main map of the local system was developed using *ithink* software, we populated the stocks and flows with data from the EMPTAYDD system, council data systems and national published data (exhibit 5, overleaf).

¹⁸ The age bands were 65-74, 75-84, and 85+ years.

¹⁹ Electronic Management of patients in Tayside Delayed Discharge system (EMPTAYDD). This is a web based facility that provides secure access for NHS Tayside and Tayside's three councils to a patient specific database, with real time reporting.

²⁰ The Audit Scotland project team did a spot check on the EMPTAYDD system.



43. Members of the modelling group gathered most of the local data. This proved to be time-consuming and required help from colleagues across Tayside, such as information teams based in NHS Tayside and the three councils. When carrying out such an exercise it is essential that all those involved in the process are clear about the definitions and terminology being used.
44. Behind the stocks and flows in the model lie a series of equations which enable the model to run and produce results. The modelling group ran the model for the first year, 2003, and sense-checked the results as a way of validating the model.
45. The model is also built on some assumptions, which are based on professional experience and agreed by the modelling group and key stakeholders. For example, it assumes that without the support of a chronic disease nurse, a patient has an average of three unscheduled hospital admissions per year.

Exhibit 5

Examples of the local data used to populate the Tayside model

Data used in the model came from existing national and local sources.

DATA ²¹	SOURCE
Demographic data by age bands	General Register Office
Admission streams - acute admission rates - non acute admission rates by age bands	SMR01/ ISD
Numbers of patients receiving treatment and rehabilitation (acute & non acute hospital settings)	EMPTAYDD system
Length of treatment and rehab period (acute & non acute hospital settings)	EMPTAYDD system
Transfers from acute to non acute hospital care	EMPTAYDD system
Discharge destinations from acute and non-acute care ie, proportion of age 65+ delay discharges going; home with complex care package; to a care home; to specialist housing	EMPTAYDD system
Capacity - specialist housing, care home (private and council)	Council data
Length of stay - care home, specialist housing	Council data
Financial information—average weekly cost of care home place, monthly cost of a specialist housing unit, average hourly cost of complex home care package, average hourly cost of non complex home care package	Council data

Source: General Register Office for Scotland, ISD and Tayside Partnership

²¹ Data in the model are arrayed by Tayside's three council areas.



Stakeholder Event 3: Stakeholders use the *ithink* model

46. The objectives of the third stakeholder event were to:

- report back on modelling group's work so far
- explore the structure, assumptions and behaviour of the emerging model
- make sure stakeholders were content with the way the model was progressing
- identify options for developing the model further.

47. This event provided stakeholders with a 'hands-on' opportunity to explore the model in the *ithink* software. Feedback from this session helped the modelling group refine the model and make it more user-friendly.

48. At this stage the model 'spine' represented the process of hospital admission, treatment, assessment and onward progress to a number of different locations for older people across Tayside. It reflected the current situation in terms of hospital admissions and capacity across the whole system, and was a basis on which we could begin to test alternative strategies for reducing delayed discharges.

49. Based on the areas that were identified at the second event (see paragraph 38), stakeholders proposed five strategies for the model to explore (exhibit 6, overleaf). These were aimed at different stages in the patient journey.



Exhibit 6

Five strategies tested out in the Tayside model

The Tayside model was used to test out five different strategies aimed at different stages in the patient journey.

Additional care home places This has been one of Tayside's 'traditional' strategies for relieving pressure on delayed discharge.
Reducing unscheduled admissions and facilitating discharges through introducing a chronic disease management programme Stakeholders agreed that a chronic disease management service might relieve some of the underlying pressure arising from demographic changes. The type of service envisaged here reflects a generic approach to identifying and managing the care needs of the frail elderly at particular risk of hospital admission through having one or more chronic conditions. It is envisaged that such a service would both reduce hospital admissions and facilitate earlier discharge.
Invest in specialist housing Analysis of EMPTAYDD data showed that the length of delay in hospital is longest for those assessed as needing specialist housing.
Increase capacity in the community for complex home care packages Invest in extra hours for complex home care packages. Complex home care packages were defined for the purposes of the model as ten hours or more of home care per week.
Speed up the assessment process in hospital Reduce the six week discharge planning period in the non-acute hospital setting. Stakeholders agreed that the model should address the effects of being able to reduce the planning period.

Source: Audit Scotland

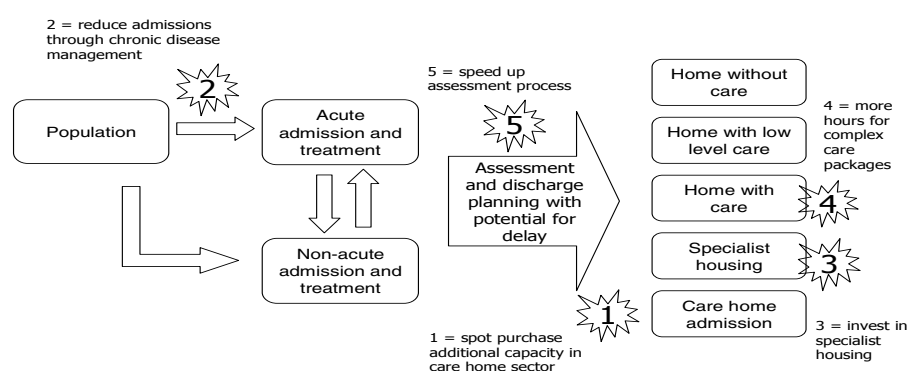


50. Exhibit 7 shows the stages in the patient journey where these strategies are likely to have some effect. This shows that we considered a range of strategies at all stages of the patient journey.

Exhibit 7

Impact of strategies in the Tayside system

This shows where the suggested strategies are expected to have an impact in the simplified model structure.



Source: Audit Scotland

Modelling work between third and fourth event

51. Based on feedback from the hands-on sessions at the third event, the modelling group refined the *ithink* model and began working on the five strategies to be tested using the model.

Stakeholder Event 4: Exploring the strategies reflected in the model

52. The objectives of this event were to:

- report back on modelling group's work and present the model
- consider the impact of different strategies on the underlying delayed discharge profile
- make sure stakeholders were happy with the way the model was progressing.



53. At this stage the model was able to reflect the baseline position (at April 2003) and the five potential strategies for attempting to reduce delayed discharge. Event 4 provided stakeholders with another hands-on opportunity to work with the *ithink* model. In groups, they explored a mix of strategies and discussed their impact on delayed discharge figures.

Modelling work between fourth and fifth event

Developing scenarios

54. The modelling group developed a set of scenarios to test out in the model. These scenarios are covered in more detail in Part 3. These are examples of ways in which the model can be used and are not recommendations for how the Tayside Partnership should proceed.

Financial aspect of the model

55. As the initiatives for tackling delayed discharges are funded from various mainstream budgets as well as from the ring-fenced money which the SEHD distributes to partnerships, it was difficult to model Tayside's budget in detail. Tayside also uses its budget to fund other initiatives for tackling delayed discharges which are not featured in the model.
56. To make the financial component of the model more robust, better cost data on social care services is needed. The model does however include estimates of costs for the various scenarios which we explore, for example, the cost of increasing hours of complex home care packages. It shows how much of the delayed discharge budget is used to fund these scenarios, and at the end of each year, shows whether the budget is over or underspent. As with other elements of the model these amounts can be altered to reflect changing circumstances.

Stakeholder Event 5: Presenting the final model and discussing the next steps

57. The objectives of the final stakeholder event were to:
- present the final version of the model
 - present the scenarios and explore their impact
 - develop Tayside's ownership and understanding of the model
 - explore the next steps.



58. Representatives from Tayside's three localities presented the final model and demonstrated to stakeholders the impact the scenarios have on delayed discharge figures (Part 3, exhibit 9). The outcomes from the various scenarios are discussed in Part 3.
59. Stakeholders discussed the benefits to them of our whole systems study and how the Tayside Partnership could use the model in the future. Key comments are summarised below, and the results of the feedback we received are highlighted in Appendix 1:
- raised awareness of whole system thinking and planning
 - provided a good opportunity to share knowledge
 - improved understanding of how delayed discharges can arise
 - greatly enhanced ownership of the issue of delayed discharges
 - provided food for thought and a strategic overview which can now be built on locally.



Part 3. Using the model to plan services

- Population estimates show that the number of older people will continue to rise, putting pressure on the whole system and the likelihood of growing levels of delayed discharges. This means that the 'status quo' is not an option and partnerships need to continue to develop strategies to deal with the impact that demography is having on the NHS and social care system.
- Using a whole systems model provides an opportunity to explore different strategies for reducing delayed discharges. But the model is only as good as underlying assumptions, and these need to be clearly thought out.
- The modelling exercise showed that no single strategy achieved a sustainable reduction in delayed discharges, but that investment in a range of strategies is needed. Changes in process may also be as important as investment in capacity.

60. A key output from the whole systems modelling work at Tayside was to develop a model which the partnership could then use to facilitate its planning. This part of the handbook looks in more detail at the various strategies which the model explores.

Impact of demographic changes

61. Before exploring the impact of the various strategies proposed by Tayside, we tested the model to get a picture of the impact of underlying demographic pressures over the next three years on the level of delayed discharges in Tayside. The model demonstrated that, based on Tayside's current admission rates, there will be steady increases in the number of older people needing treatment in hospital. This could lead to significant increases in the number of delayed discharges.²²
62. Exhibit 8, overleaf, illustrates this point, taking delayed discharges in Angus as an example. In the graph we can see what happens to delayed discharges in Angus if no further action is taken to tackle delays. This significant increase in the number of delays is caused entirely by an ageing population leading to increases in hospital admissions and more delays.

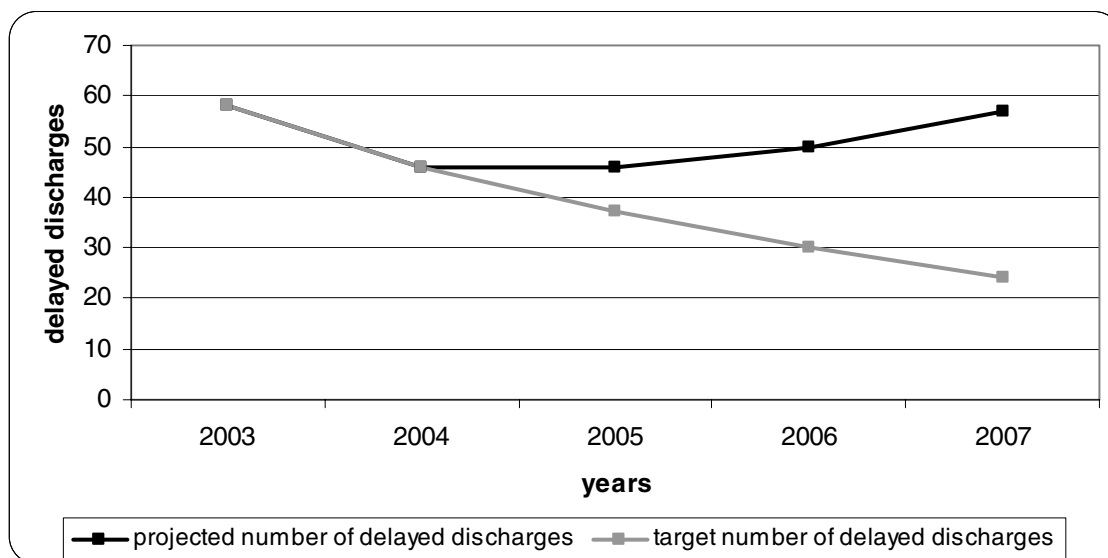
²² The increases in the older population are more marked for Angus and Perth & Kinross Councils.



Exhibit 8

Using the model to demonstrate the impact of demographic change on delayed discharges in Angus Council (April 2003 to April 2007)

As the older population in Angus grows, the delayed discharge target becomes harder to achieve.



Source: Audit Scotland

Scenarios

63. Part 2 of the handbook discussed the various strategies that were put forward to be tested out in the whole systems model. These were built into various scenarios for each of the three council areas. The scenarios gave different priorities or roll-out sequences to each of the strategies and illustrate that, although the model has been built as a Tayside-wide product, it can also be used to develop strategies in each of the three council areas. The scenarios are not recommendations for action for the Tayside Partnership, but are examples of how alternative strategies can be tested on the model.
64. The scenarios developed for each council area are summarised below and shown in more detail in exhibit 9 overleaf:
- Angus Council – a gradual reduction in reliance on care home placements with initial investment in home care whilst reducing assessment time in hospital, and longer-term investment in specialist housing
 - Dundee City Council – early investment in specialist housing and reduced reliance on additional care home places followed in the medium term by investment in chronic disease management nurses and then in home care support



- Perth & Kinross Council – an initial focus on reducing assessment time within the non-acute hospital setting followed by a more gradual reduction in reliance on additional care home places, medium-term investment in home care capacity followed later by chronic disease management nurses and additional specialist housing units.

Exhibit 9

Scenarios for Angus, Dundee City and Perth & Kinross

Period	Scenario for Angus	Scenario for Dundee City	Scenario for Perth & Kinross
Year 1	Purchase 3 additional care home placements a month and achieve a reduction in assessment time of 3 days.	Purchase 4 additional care home placements a month and achieve a reduction in assessment time of 3 days.	Purchase 4 additional care home placements a month and achieve a reduction in assessment time of 3 days.
Year 2	Reduce additional care home placements to 2 and invest in 400 extra hours of home care for complex packages.	Reduce additional care home placements to 2 and invest in 10 units of specialist housing.	Continue with 4 additional care home placements and reduce assessment time by 14 days.
Year 3	Reduce additional care home placements to 1 and invest in a further 400 extra care hours of home care and reduce assessment time by the full 14 days.	Reduce additional care home placements to 0 and invest in 10 chronic disease management nurses.	Reduce additional care home placements to 2 and invest in 800 hours of home care.
Year 4	Continue with 1 additional care home placement a month and 14 day reduction in assessment time but add 10 units of specialist housing.	Add 800 hours of home care for complex packages and reduce assessment time by 14 days.	Add 10 chronic disease management nurses and 10 units of specialist housing.
Outcome	A reduction from 58 to 33 (43%) delayed discharges over four year period.	A reduction from 82 to 51 (38%) delayed discharges over four year period.	A reduction from 65 to 38 (41%) delayed discharges over four year period.

Source: Audit Scotland



Exploring the impact of scenarios on Tayside's system

65. We ran each of these scenarios in the model and found that they did achieve reductions in delayed discharges over the four year period in each of the localities (last row of exhibit 9). However delays were not eliminated completely.
66. We also looked at the potential impact of each scenario in isolation across Tayside (exhibit 10), for example, if Angus, Dundee City and Perth & Kinross focus only on changing care home places by the numbers illustrated in exhibit 9, the model illustrates that this will result in an increase in delayed discharges of 10% across Tayside by March 2007.
67. The year-on-year percentage reductions for Tayside's delayed discharges, achieved by combining the scenarios, are illustrated in the last row of exhibit 10.

Exhibit 10

Year-on-year percentage changes in Tayside's delayed discharges, 2003/04 – 2006/07

	% change in the number of delayed discharges across Tayside			
	2003/04	2004/05	2005/06	2006/07
Change number of care home places	-20%	0%	+5%	+10%
Invest in chronic disease management programme	-20%	-4%	+3%	+6%
Invest in specialist housing	-20%	-5%	+2%	+6%
Speed up assessment	-20%	-15%	-4%	+4%
Increase hours for complex home care packages	-20%	-3%	+4%	+5%
Combined scenarios	-20%	-11%	-7%	-11%

Source: Audit Scotland



68. Using the scenarios which we developed to demonstrate how the strategies could be tested in the model, we found that:
- pursuing each scenario in isolation resulted in significantly poorer performance compared with the combined scenarios. Exhibit 10 illustrates a 10% increase in the number of delayed discharges over the four year period if investment is just on care home capacity, or 6% increase if investment is just in chronic disease management programme, whereas there is a 11% reduction in number of delayed discharges if all five scenarios are adopted together
 - reliance on changing the number of care home places, in isolation, appears to produce the poorest performance overall
 - shortening the assessment time appears to sustain reductions in delayed discharges for longer than any other single scenario.

Benefits and lessons learnt from building the interactive model

69. The process of building this interactive model highlights the importance of using a whole system approach to tackling delayed discharge. The exercise gave key stakeholders, from across the Tayside Partnership, the opportunity to share their understanding of the local system; explore the complexity and challenges of reducing delayed discharges together; and understand the impact of changes in the system on delayed discharge figures.
70. By enabling stakeholders to investigate the impact different strategies could have on their system, we learned that:
- it is important to provide a balance of strategies if sustained reductions in delayed discharge are to be achieved
 - there is no single/one size fits all solution (the three council areas in Tayside needed a mix of different strategies)
 - changes in process are as important as investment in capacity eg, shortening the assessment period in hospital
 - although each of the strategies produced reductions in delayed discharges in Tayside, without redesign of processes there appears to be a level of delayed discharges below which it would be extremely difficult to go.



Next steps

71. Over the next six months the Tayside Partnership plans to use the model as a tool to inform and help the local delayed discharge planning and decision-making processes. The Tayside members of the modelling group plan to maintain the modelling skills they have acquired by developing elements of the model and updating the data as required. After this time, they plan to carry out an evaluation of the model's effectiveness.
72. The interactive model developed for Tayside can be viewed at www.audit-scotland.gov.uk/publications/ddischarges.htm. Copyright of the model lies with Audit Scotland.
73. The Tayside model is not something that can be used by other partnerships to reduce their own levels of delayed discharges. It is clear from this handbook that the Tayside model has evolved from discussions among Tayside staff about how their system operates and has been built using Tayside data. We hope that other partnerships may benefit from our experience in Tayside in developing their own whole systems thinking.
74. For further information please contact Mark Diffley at mdiffley@audit-scotland.gov.uk.



Appendix 1. Feedback from Tayside

Feedback from Tayside

At the fourth event stakeholders indicated their initial views on the project. They reported that the process of building the model resulted in:

- a significantly improved shared understanding of the Tayside delayed discharge system
- the realisation of the complexity and challenge involved in addressing the issues underlying delayed discharge
- the potential to improve resource allocation
- greatly enhanced ownership of the issue.

At the fifth event, participants completed a questionnaire giving their views on the stakeholder events and future use of the model.

- stakeholders were asked to rate (on a scale of 1 to 10) how realistic they thought the model was in terms of how it represents the local system. The average score was 7.2
- views on the running of the stakeholder events were generally positive
- one of the most highly rated aspects of the events was the opportunity for participants to be involved, although some felt more front line should have attended
- most participants said that they were very or fairly likely to use the model in their future work, although some felt the model would require more rigorous testing with a wider audience.

Moving on?

A handbook on modelling the whole system for
delayed discharges in Tayside



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