TheCumberlandInitiative
TRANSFORMING HEALTHCARE QUALITY AND COSTS

WHOLE Systems Partnership

THE ETHOS PARTNERSHIP

# Complex care, frailty and integration

## Exploring the role of simulation and modelling

# Discussion starter

## Context – identifying the challenge

There is no doubt that providing services for people with complex needs is amongst the toughest challenges facing the public sector in the decades to come. Whilst winter pressures and waiting times in ambulances or at A&E catch the headlines, the inexorable rise in demand from this client group is reported repeatedly, both anecdotally and across a range of published material. For example, work done by WSP in the area of end of life services indicates how we should plan for a greater proportion of deaths, and therefore the type of support and care needed in people's last year of life, that fall into the category of frailty rather than particular conditions such as cancer, organ failure or other terminal conditions.

A simple reflection on the population make-up of the UK suggests that this is as much a socio-economic challenge as it is a health and care challenge. The generation that was born with the NHS have benefitted tremendously from improved health services, not withstanding the significant contributions to health improvement from addressing the wider determinants of health (see box). Coupled with the increased birth rates of the 1950's and various waves of immigration, the number of older people in our communities will continue to grow in real terms, and as a proportion of the overall population, until at least the 1930's.

*My own father, at the age of 17, was ill in bed in the family home with Rheumatic fever in 1948 when he over-heard a conversation in the hallway between his father and an aunt debating the merits of sending him to hospital. His own father worried about the cost. But his aunt, who had trained as a nurse, had already sent for the ambulance – he was then one of the earliest patients of the NHS as he was cared for on a ward of ex-miners with various respiratory conditions. Over the next 65 years he ran a business and had a family, enabled and supported by both the NHS and his wife, despite the legacy of a weak heart. He is now becoming frail……*

In the face of rising demand, plus an underlying requirement to ensure value from taxpayer's money, and, since 2008, the straightened financial circumstances, we have seen the adoption of a range of approaches designed to address these challenges. Ever since Griffiths introduced a cadre of general managers in the late 1980's there has been the search for, and adoption of, different tools and methodologies to achieve this. One set of tools that have been

available, although with limited adoption, are those that the Cumberland Initiative is now seeking to promote more extensively, i.e. simulation and modelling.

## The use of simulation and modelling

In part the use of simulation and modelling in industry and other sectors of the economy has been driven by technical developments and capabilities, particularly in the world of computing. But other approaches to simulation and modelling that do not rely on increased computer RAM have also been used in the health and care sector. Operational Research has led the field in terms of academic and practical applications for modelling and simulation in industry, which has resulted in a range of tools that have delivered real improvements in a range of sectors. The Cumberland Initiative has, however, pointed out the disparity between progress in other sectors and the health and care sector.

Reasons for the reluctance to adopt modelling and simulation in health would be the subject of a separate paper; although there are two pitfalls worthy of note. These are that we will either pick the wrong tool for the job, or that we will rely on the tool when it is the users and collaborators in the use of the tools that need as much, if not more, attention. To address these pitfalls the Cumberland Initiative's forebears in the RIGHT project developed a guide to the range of tools and methodologies available and when they should be used. In addition, through its regular gatherings, participants in the Cumberland Initiative have continued to stress that change supported by simulation and modelling is 80% human and 20% technical!

## Reconceptualising the challenge?

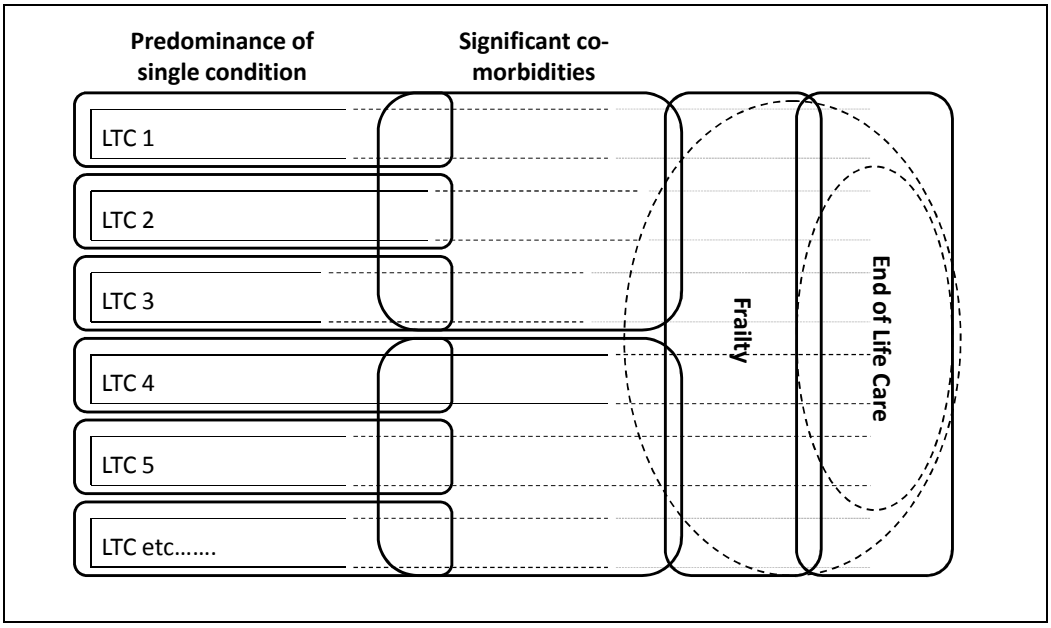
With this context and the potential pitfalls in mind, we return to the subject of understanding and addressing the needs of people with complex needs, and identifying modelling and simulation tools that will help us. A common context in which to use a range of simulation and modelling techniques is that of the care pathway. A sequence of events can be mapped out and a mix of 'soft' and 'hard' (i.e. qualitative and quantitative) approaches can be applied to addressing capacity constraints, points where risks or mistakes are more frequent or simply accommodating feedback from service users. Where pathways are clear and repeatable there is benefit in terms of efficiency, outcomes and engagement for these approaches.

However, people with complex care rarely have needs that can be mapped out in this way. I would suggest, therefore, that there are two 'mind-set' shifts necessary when thinking about this group of clients.

1. WSP, and other people's experience, in this area is that identifying 'rates' of access to different services based on a set of needs for groups of people along with historic patterns of access can be used to simulate possible future service needs. This is not a 'predictive' approach but does provide a 'do nothing' environment in a classic experimental approach, i.e. isolating the impact of particular interventions whilst recognising that the environment remains complex and that careful judgement is still required when making use of the simulation outputs. Thinking about groups, or cohorts of people, rather than individuals is therefore a useful conceptual shift.
2. A second common conceptualisation of needs for people with long-term conditions has been a 'left to right' progression typical of single conditions, i.e. from prevention, through incidence to early stage of needs and then on through a progression of increased need. Such an approach, however, fails to capture the complexity of needs and any allowance for improvement and

recovery. It is also an approach that retains the primacy of single conditions, even when more than one is present. This emphasis on single conditions, when people actually have more than one, can tend toward either duplication, leading to higher costs and poor patient experience, or in missing the truly complex needs, leading to higher risks and poorer outcomes. The challenge is therefore to understand, identify and plan for complex needs that will be characterised by multiple conditions and/or frailty – this requires a complementary conceptualisation of the needs of people with multiple or complex needs that introduces a 'right to left' mindset, i.e. one in which the needs of this growing population cohort are proactively sought out and where service configuration emphasises integrated responses.

The identification of population cohorts and the complementary 'right to left' conceptualisation of the traditional progression of needs are illustrated in the diagram below:




## Using simulation and modelling to make a difference

I have suggested above that no single simulation and modelling tool can address all the needs of planners, commissioners and professionals in the field when it comes to those with complex and multiple needs. It is therefore important to recognise that the need for a comprehensive approach to using simulation and modelling techniques is an important starting point. In selecting simulation and modelling tools for the task it is good to start with the questions that can be addressed using these tools. The following list is simply a 'starter for ten':

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| ***First: how many people, and at what levels of need or risk are there?***<br>Answering questions that inform the capacity of any proactive/preventative service response and the potential for reductions in the occurrence of the risk being managed. | Predictive modelling (the static risk stratification of need) and subsequent response through proactive services is an important tool. |

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| ***Second: where is need most prevalent?***<br>Answering questions that inform the distribution or location of services either to ensure access times or to address inequalities within a population. | Geographic mapping and the modelling of behaviour and access by different groups of patients to key services. |
| ***Third: how do we ensure that an intervention is undertaken in an efficient and effective way when circumstances require it?***<br>Answering questions so that we are able to smooth the pathway when people need specific and largely repeatable interventions. | Pathway modelling using a range of alternative simulation and modelling tools have been shown to be effective and helpful in this area. |
| ***Fourth: how will population needs change over time in response to 'what if' questions?***<br>Questions that help partners to understand and respond to the impact of different scenarios, many of which are in the gift of commissioners or professionals, some of which are not. | Tools that support the clear identification of cohorts of need and the inter-relationship between different parts of the service provide invaluable learning environments for partners. |

None of the questions or tools suggested above is mutually exclusive, nor is it suggested that they could be deployed in isolation. Combining different tools is a live and potentially fruitful sphere of activity, both in research and in the practical application and day-to-day use of these tools.

Our own experience from over 20 years using system dynamics modelling in the context of strategy and partnership development points toward a range of decisions and service changes that would not have happened were it not for the use of these tools. For example, modelling end of life care needs gave one local group of commissioners the confidence to appoint a community geriatrician in recognition of the increasing numbers of the frail within their local population. Elsewhere a range of new, and appropriately scaled, intermediate tier services have been introduced that have made a significant contribution to reduced whole system costs in long term care and hospital admissions. Further, growing confidence in the intelligence developed using simulation and modelling is allowing far greater local sensitivity in balancing demand and supply in workforce planning at a regional level.

Modelling and simulation are tools that are used as part of a decision making process. Other factors contribute to whether the insights and learning that arise from the modelling process lead directly to bottom-line savings. Other measures of success such as improved quality of outcomes or improved partnership working therefore need to be taken into account in any evaluation of their use. Having used these tools, however, many people will attest to the fact that without them you feel like you're flying blind.

## Some possible research questions

The Whole Systems Partnership has been a leading practitioner in the use of system dynamics as part of the modelling and simulation toolset that focus particularly on the third and fourth examples above. We are conscious, however, that without addressing other questions, where system dynamics is a blunt tool, then a rounded solution that has the potential to transform service delivery in line with the needs of those with complex or multiple needs is unlikely to be achieved. We have therefore identified four initial research questions we believe can support the use of simulation and modelling approaches:

1. How do we define and distinguish between cohorts of population needs? Using 'big data' and learning from the early years of predictive modelling to identifying meaningful cohorts of patients, in the context of which service redesign can take place.
2. What service models need to be reflected in our modelling and simulation tools and how do we know which service models match the needs of which population cohorts, including intelligence about when the law of diminishing returns sets in? Taking an increasingly international perspective on cataloguing and distinguishing between approaches to service delivery that match the needs of patient cohorts.
3. What contribution does co-production and collaboration in the development and use of the tools make? Exploring and designing strategic interventions in such a way as to ensure local ownership whilst building on expert evidence.
4. What contribution does the human side of system change make, particularly in the sphere of patient-clinician relationships? Research into the impact of relational resources within a care system on the effectiveness of outcomes of service models.

These are not the only questions that can be asked, but if research and implementation studies were to be commissioned at sufficient scale and over a long enough timescale to allow for learning to be identified and shared on an on-going basis then the sort of change envisaged by the Cumberland Initiative would be within reach.

## Broadening the insights

I have set out above the basis for conceptualising the challenge of meeting the needs of people with multiple and complex needs in ways that are amenable to the use of simulation and modelling techniques that can assist in this task. This is simply a first step that leads to an iterative, learning approach. Participants in this round table discussion have a range of distinct and relevant areas of expertise that can help refine this initial description and direction of travel. Insights from round table participants will, for example, add value from the perspectives of:

- The wider social care needs of people, and the statutory responsibilities that the public sector has to meet these needs;
- The often overlapping mental health needs that people have;
- An understanding of frailty and the contributory factors that make up these needs;
- The needs that people approaching the end of life have, whether these reflect single conditions, multiple and complex needs or increasing frailty;
- The impact on training and development for a workforce that has traditionally had a leaning toward specialisation;
- The way that we undertake research into these challenges and how this can inform the use of simulation and modelling;
- The way that organisations work within the public sector to deliver improvement and quality for people who need care and support.

Participants are asked to consider the particular challenges that the growing cohort of people with complex or multiple needs, including those who are frail, have brought to their own areas of work. Those who have had greater exposure to the work of WSP in the use of system dynamics have been asked to prepare a short insight that should enrich this initial thought piece. They have been asked to identify decisions and their consequences that were made with the assistance of modelling and simulation and then

to ‘complete the sentence’ with between 3 to 5 ‘bullet points’ that they can speak to for no more than 5 minutes at the round table event:

***Give an example(s) of the things that were achieved where simulation and modelling played a significant part.***

**Complete the sentence:** ***Having had some experience of how simulation and modelling can help us understand and plan for the future we would contribute the following challenges, insights or opportunities relevant to the use of these tools in understanding the needs of people with complex of multiple conditions from our own area of expertise……..***

## Discussion starters

Further discussion and consensus building will be centred on the following questions:

1. Are the challenges to reconceptualise how we understand the needs of people with complex or multiple conditions appropriate and meaningful – would they take us forward and if so how far…
2. How would we evidence the benefit of using simulation and modelling and what evaluative approaches would be appropriate?
3. What other questions might simulation and modelling help to answer?
4. Would the four research questions be a helpful place to start or would you add, subtract or substitute others?

Please come with your thoughts on these questions. The aim of the session is to lay some foundations for taking a range of possible research and implementation challenges forward through the use of modelling and simulation in the context of the Cumberland Initiative with its broad set of skills and networks.

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