

# **Simulating health and social care delivery: Can the tension between individual patient path ways and strategic planning be addressed?**

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*In this presentation we discuss the use of system dynamics to understand the delivery of health and social care. We report on the development of a simulation model to address the issues of elderly care in a local health care system in the South East of England. We explore the appropriate level of aggregation for a model to address the policy challenges faced by local care organisations. While we recognise the value of a highly aggregated systems dynamics approach and the danger of inappropriate disaggregation, we argue in the presentation that features of the care system (such as the recurrence of admissions to the hospital) make it desirable to include some aspects of patient history in a flow model of patient path ways. We examine the feasibility of a more disaggregated approach and the influence of this choice for the understanding of the system and the development of beneficial policy options.*

As Western societies age and the cost of providing health and social care rises, innovative approaches to the delivery of services are becoming increasingly important. Such new approaches include an increased emphasis on rehabilitation, the delivery of care in new settings (such as in intermediate care facilities and the client/patients' own home) and the support of care delivery by technical means (e.g. telecare systems).

Health and social care delivery is a complex system whose development is strongly influenced by the actions of different actors such as health and social care providers, funders, as well as vulnerable individuals and their families. Actions in one part of the care system often have unexpected and unwanted consequences elsewhere. Costs and benefits of any change are unevenly distributed across the system. Systemic thinking is therefore required to plan and implement changes effectively and successfully. In the UK, the government has recognised this, at least in principle, and promoted a "whole system approach" in health and social care planning.

The System Dynamics approach is well suited for the study of policy issues in the provision of health and social care for the elderly. The published work in the area generally derives major insights from the analysis of the system structure on a relatively aggregated level. Wolstenholme (1993 and 1999), Linard (1996) and Walker and Haslett (1999) are some examples of past work in this area. Clearly, this analysis on a

more aggregate level fits well into the spirit of the system dynamics approach, and exploits its strength.

In addition to the tensions between the goals, policies and actions of different organizations, there are also tensions within organizations. A major characteristic of management in health and social care organizations is the tension between decision-making on different levels. These are the level of the individual patients (with their particular history) and the strategic level within an organization. In addition to being a “principal – agent” problem this is also an expression of the different type of information available on a strategic level and on the level of an individual patient.

The aggregate, systemic outcome arises as a consequence of the care pathways of individual patients, which in themselves are not relevant for policy level and strategic decision-making. The system dynamicist can (and should) ignore the lower level elements and relationships which do not influence the policy recommendation – unnecessary details are noise which obscure the understanding of the system. However, inasmuch as the *collective effects* of a more detailed disaggregation influences systemic outcomes and policy recommendations, they cannot safely be ignored.

The individual history of somebody in a care situation matters in influencing the further path of care delivery. Many problems of the health care system (such as repeated hospital stays of inadequately supported at risk individuals in the community) or expected effects of policies (such as an emphasis of rehabilitation and prevention) cannot be adequately studied in an ahistoric “once through perspective” where each episode is new and changes to flow rates as patients cycle to through the same care setting cannot be captured. However, including the history of individual patients is certainly neither desirable if our aim is to foster a policy relevant, system level understanding of care delivery, nor feasible within a well-constructed system dynamics model.

This presentation explores to what extent it is possible to capture the *policy relevant effects* of the care paths and history by segmenting patient groups in care settings (e.g. the hospital) and including different flow rates between and according to these segments. This attempt to better understand aggregate effects has to be distinguished from segmentation to introduce additional detail. Different options for such a segmentation (e.g. according to the number of previous hospital visits or to the home care package received before the hospital stay) have consequences in terms of data requirements and the structure and complexity of the system.

In the presentation, this discussion is applied to a model of health and social care delivery which was developed for a location in the South East of England in order to understand the impact of healthcare innovations such as telecare on the local care economy. The model allows assessing the impact of choices regarding the capacity (and type) of available care services and regarding referral policies on the different components on the care system.

We emphasize that an appropriate balance between aggregation and segmentation can help to develop valuable insights into key strategic and policy issues while minimising

the danger of obscuring the model structure and introducing unnecessary complexity. In particular, this approach allows the design of policies which address the important issue of the recurrent admission of patients into the hospital<sup>1</sup>. We argue in the presentation that this attempt can to some extent the tension between individual patient path ways and strategic planning can support the implementation of service innovations which have systemic benefits for the health and social system.

## References

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<sup>1</sup> This important problem in care delivery for the elderly is similar to problems in many other policy areas, such as the problems of recidivism in welfare reform. (Richardson *et al.*, 2002)