

Rehabilitation modelling resource

Purpose

In May 2020 Welsh Government produced a policy document ‘Rehabilitation: a framework for continuity and recovery 2020 to 2021’. This framework supports services to plan for the anticipated increased demand for rehabilitation of population groups, including both adults and children. Subsequent work has confirmed the model's applicability beyond Covid-19 to meet the wider rehabilitation needs of people across Wales.

As part of this Welsh Government All Wales Rehabilitation Framework: principles to achieve a person-centred value-based approach (2022), it was essential to develop a modelling resource to underpin this work and guide services to predict the demand on rehabilitation services and consider whether services are available and in the right places to deliver what is required. Service modelling is used frequently within modern care delivery to help support understanding of the need for services within communities and to match capacity, and the utilisation of resources to match this demand. The rehabilitation modelling resource has been developed using analysis of data, published and unpublished evidence and local anecdotal information. This information has included estimated parameters which have been assigned to enable quantification of how demand will present over time.

The rehabilitation modelling resource is a visual aid to help service managers, professional leads, and planners to explore demand for rehabilitation needs. The modelling tool can also allow for the mapping of current and future services to meet the rehabilitation needs of national and local populations. The collection of accurate and meaningful data, which is explored in the associated [Rehabilitation Evaluation Framework](#) will feed through the model to enable more realistic predictions of current and future rehabilitation needs.

Process of developing the modelling resource

This document presents the modelling resource which has been developed through a collaborative approach between Welsh Government, clinicians and service managers, statisticians/mathematical modellers, and senior managers within the NHS delivery unit.

The modelling resource was initially developed with a Covid-19 focus. Evidence was drawn from national and international data and research that links to Covid-19 but also similar pandemics or disasters, as well as local Welsh data and anecdotal information from services delivering care. It was recognised that the novel nature and rapidly evolving impact of the Covid-19 virus did not allow services to draw on wide ranging and robust evidence. The team creating this therefore used all available resources, including those from other pandemics and disasters, to predict who, when and how much rehabilitation may be required for different cohorts following Covid-19 and it is likely to change and adapt as new evidence and information emerges.

The modelling professionals guided the group using an operational research problem structuring approach¹, and worked with the work-stream group to develop a conceptual stepped care rehabilitation model of the possible flow of cohorts into and between services. The collaborative brought their extensive experiential and research knowledge to work together to structure, initially, a series of rich pictures of the key aspects of flow for each cohort, and which were refined into a structured conceptual stepped care rehabilitation model of requisite detail through several subsequent meetings where participants reflected on the evidence and local intelligence. This resulted in a flow diagram representing tiered intensity/complexity of services, as an effective means of capturing the pathways of care.

Following the above approach to create a stepped care rehabilitation model diagram, values have been assigned to the proportion of a cohort that will flow through each route, and how long a member of the cohort will spend at each stage. These are represented as a system of waits and activities (or nodes) which allow, with the use of key assumptions and data available, to construct an initial mathematical modelling resource which starts to allow for the forecasting of service demand over time.

The model can be used post pandemic to reflect the wider applicability of the conceptual model and the modelling resources.

The modelling resource is designed to act as a challenge to services and enable us to check whether the design of the resource reflects local presentations. This resource aims to support data collation and the establishment of a baseline of rehabilitation (during non-Covid-19 times). The proposed deterministic (i.e., no randomness is involved) modelling resource can be simple in nature but should give a high-level

¹ DOI: [10.1016/j.ejor.2007.02.027](https://doi.org/10.1016/j.ejor.2007.02.027) Howick, Susan & Eden, Colin & Ackermann, Fran & Williams, Terry. (2008). Building confidence in models for multiple audiences: The modelling cascade. European Journal of Operational Research. 186. 1068-1083. 10.1016/j.ejor.2007.02.027.

overview of predicted demand over time and could be used for a variety of scenarios (e.g., best case, worst case etc.)

The team who has worked together to develop this model continue to engage with a wide number of partners to test and refine the proposed model in all parts of Wales.

The Rehabilitation modelling tool

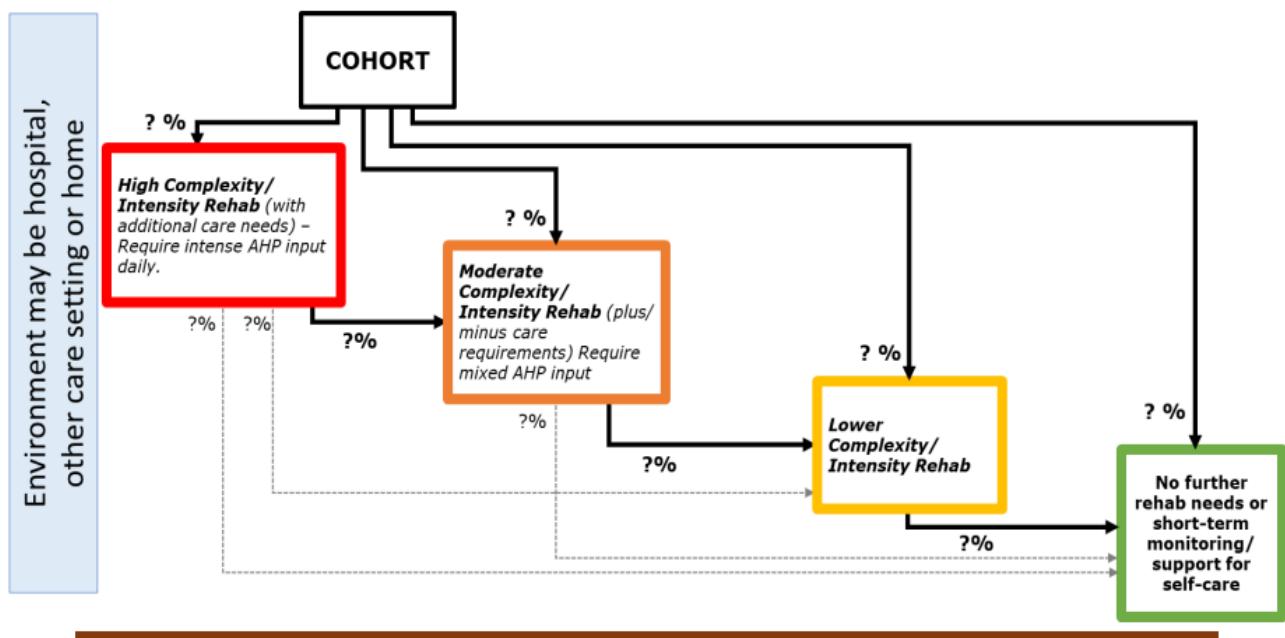
A national rehabilitation dataset definition is still in development by Digital Health Care Wales and the development of this modelling resource has had to consider many unknowns, informed by case examples and expert judgement. We are hoping to continue to build the evidence, as we work with services, teams, and local planners, to help us further develop and change the model to accurately reflect the rehabilitation needs of people. We have had to use some principles and assumptions to underpin the modelling resource; as you view the model you will have many questions, so please consider how the guiding principles have shaped this work.

These are summarised below:

- a. The modelling resource is designed to reflect rehabilitation needs and does not include the provision of care related activities that may be required in addition to rehabilitation.
- b. The modelling resource has not been fully tested with services that deliver rehabilitation to, for example, children and families or mental health (to name a few) or with scrutiny of the types of rehabilitation offered (e.g., specific therapies/ reablement/ prehabilitation). It is anticipated that the flexibility of the resource will be applicable to all these types of services but further testing and collaboration with people delivering these services is crucial to the development of the modelling resource.
- c. Whilst developed as a national model for understanding demand, the model will be applied at a local level to incorporate specific population demographics, cultural differences, and local data.
- d. The model is not based on a single time point as people may present at different times.
- e. The rehabilitation model is not focussed on the environments where rehabilitation takes place (e.g., hospital/ care settings). Each service may currently deliver rehabilitation in a variety of settings and the level of rehabilitation required should not be associated with specific places. The resource emphasises the extent and nature of rehabilitation needs so that the model is flexible to reflect local service delivery and the wide-ranging and multi-

agency approaches used to deliver rehabilitation in different parts of Wales. Additional information on the factors that may determine where rehabilitation takes place is contained in the scoping literature review linked to the Welsh Government Rehabilitation Framework: principles to achieve a person-centred value-based approach (2022) and guidance paper.

- f. This resource is designed so that it can also be utilised to predict demand for rehabilitation under a range of circumstances (such as during the pandemic, when usual services resume post-pandemic, and into the future). This is important for understanding and predicting the demand for all rehabilitation services in the future.
- g. The rehabilitation modelling resource is designed to complement other modelling resources related to e.g., right-sized communities' and discharge planning.



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How can you use this model as a resource for learning in your organisation?

1. In the first instance, use the model as a different way to view your own system – does my system look like this? If I had to summarise my system in this way, what would it look like?
2. Do you have access to the data that you will ‘run through’ the model- how does it make you aware of the information that is missing?
3. Consider the proportions and the durations within the model: explore what ‘adding 1000 people at the top’ will look like over time. Does this match with

what was expected or what you have or are experiencing? Are you able to provide an answer with respect to your system?

4. Consider your definitions and understanding of the cohorts: do you concur, do you know more or less about them than stated in the definitions? Could you express the cohorts as a graph over time? i.e., when did/will they present to become an 'arrival' to services in the top of the model?
5. Piecing it all together: It is possible to feed through what you understand your cohorts to be into the model? Is it possible to obtain that same picture of your real system? If not, why not – data capture or ...
6. What do you need to inform your planning – this or more/less detail?

Planned next steps

This work continues to be shared with clinicians, managers and planners in services that deliver rehabilitation to support service, test the value of the resource and inform further development of the modelling. Monthly drop-in sessions are available for peer support. Videos of previously held engagement events are available on the NHS Wales SharePoint. These provide brief training about the value of modelling and then aim to demonstrate the model (using data collected from national informatics and one UHB) for cohort 1 to allow clinicians, managers, and planners to enhance understanding.

The team continue to welcome your comments on this resource and are asking for people to come forward to provide case studies and inform benchmarking.

Please get in touch if you wish to comment or further discuss how you use the modelling resource: wmc@wales.nhs.uk