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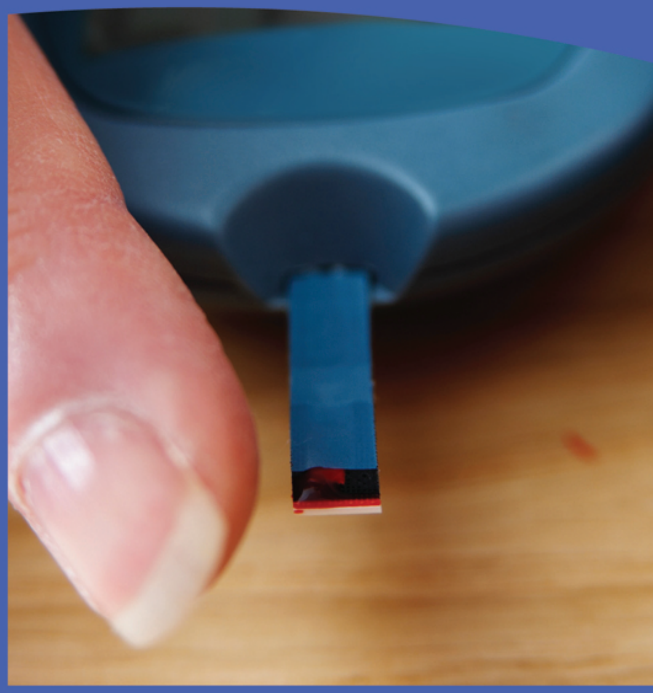
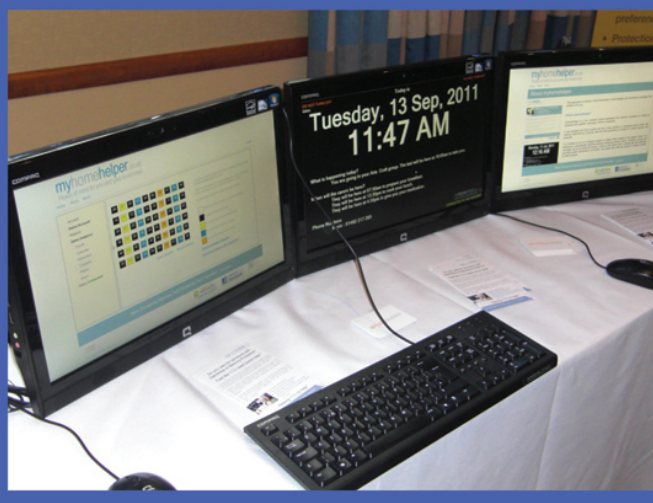


Telemonitoring

for Long Term Conditions



A workbook for implementing new service models

Dr Paul Rice,
Telehealth Lead, October 2011

The Purpose of this Document

This workbook

This workbook sets out how Telemonitoring can contribute to new service models for the care of people with long term conditions. It details the importance of introducing Telemonitoring to enable productivity and quality improvements. The workbook includes:

- The evidence base and benefits of Telemonitoring.
- A framework detailing how Telemonitoring will impact services.
- A practical step by step guide to implementation.
- A checklist of key strategic and operational questions critical to ensuring maximum benefits are realised.

The focus is on what a technology can add rather than who supplies it. Whilst individual home "hub" devices have dominated to date, mobile technologies and multi-user applications are emerging. These offer further possibilities for innovation. We note the challenge of interoperability but do not dwell upon it.

We are keen to ensure that users of the workbook understand that whilst the technology enables us to do things that we could not do without it, the prize is the redesign of care pathways and what this brings - the potential for proactive care to replace reactive; intelligent to replace episodic and participative and integrated to become the norm.

The audience

This workbook is written for:

- Operational managers in health and social care, charged with implementing new service models incorporating Telemonitoring.
- Senior managers who will find it useful in informing strategic service design and planning.
- Clinical audiences who should find the material equally interesting, relevant and accessible.
- Users and carers to help raise awareness and expectations, and generally advance understanding.

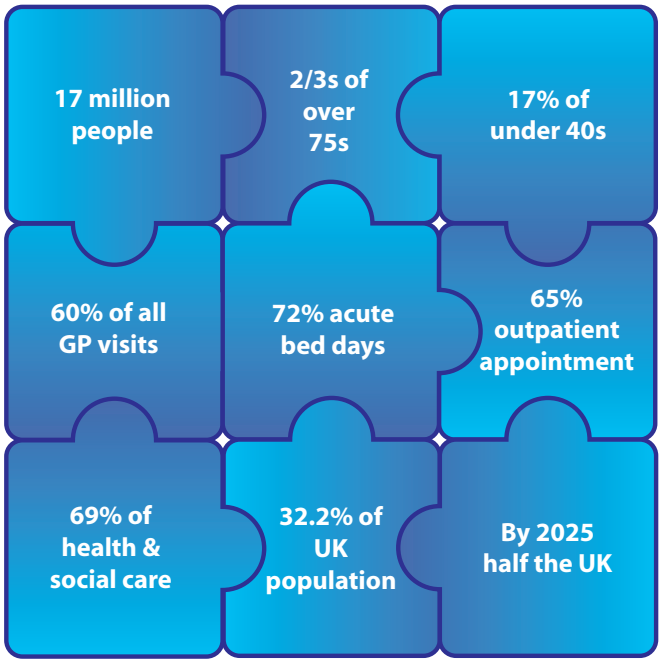
Contents

Chronic Disease in the UK

Context

Growing numbers of people with multiple conditions are living longer and resources to support their continued well being are increasingly stretched.

Summary of the prevalence of long term conditions and their associated service usage in the UK.



Health and social care professionals are stretched expert resources that need to be targeted at those most vulnerable at exactly the right moment. Individuals and their families and carers, want and need more information to manage their lives for the majority of the time when they have no contact with professionals. When that contact occurs, the quality of the interaction is significantly influenced by the clinical data and patient information available, this includes:

- Is the patient stable or exacerbating?
- Is the information timely, accurate and consistent?
- Can trends in vital signs be identified and potential deterioration spotted at the earliest opportunity?
- Should the patient be advised to alter their medicines' regime?
- Where the patient is stable and self-reporting as feeling well, can a scheduled face-to-face visit be reassigned to someone in more immediate, severe need?

These sorts of questions go to the heart of prevention, management, quality and cost. They have stimulated the development of new service models incorporating assistive technologies that are generically called Telemonitoring. The organisation and delivery of services incorporating Telemonitoring varies, sometimes subtly, sometimes more profoundly. Increasingly, the service options and the respective and relative benefits and drawbacks of each are becoming well understood and evidenced.

Case examples from the Yorkshire & Humber Region

NHS North Yorkshire & York / NHS Barnsley

Pioneering Telemonitoring work is currently underway in NHS North Yorkshire & York that has seen approximately 500 patients with long term conditions benefit from having new service models incorporating Telemonitoring introduced into their homes. Patients have welcomed this additional level of care and feedback from patients about their experience has been almost universally positive. As larger numbers of health professionals have become involved and more elements of existing care pathways overhauled, the local health and care services have identified real benefits. An independent evaluation on a smaller initial cohort of patients recorded a 40% reduction in emergency hospital admissions for those patients being Telemonitored compared with normal levels and a 28% drop in A&E attendances. NHS NY&Y are currently rolling out the initiative to cover 2000 people.

NHS Barnsley

NHS Barnsley have introduced Telemonitoring (coupled with Motivational Telecoaching) as a fundamental element of their "People in Control" agenda. Adopting the WHO definition of health – a state of complete physical, mental and social well being and not merely the absence of disease or infirmity – the organisation is tackling the key factors that affect people and how long they live. The Integrated Tele Hub provides a single point of contact for patients and carers. It provides universal information, support and guidance as well as signposting (care navigation) to relevant services across health and social care. Barnsley have coined the phrase "intelligent dispatch" to ensure that contact with patients and users is proactive, intelligence led and integrated. A large Telecoaching resource and an increasing Telemonitoring deployment ensure that they are delivering a holistic approach to the management of people with singular and multiple long term conditions. Barnsley have plans to recruit up to 2,500 people to the Telemonitoring service going forward.

What is Telemonitoring for Long Term Conditions

What is Telemonitoring?

Telemonitoring is the ability to record, store and, as necessary, forward detailed information about the "vital signs" of a patient at any particular point in time. Vital signs are measures of various physiological statistics, traditionally taken by health professionals or support staff, in order to assess the most basic body functions.

Vital signs

Vital signs are an essential part of a consultation. The act of taking vital signs normally entails recording body temperature, pulse rate (or heart rate), blood pressure, and respiratory rate, but may also include other measurements such as blood glucose levels for someone with diabetes. Recent developments in telecommunications now allow people with long term conditions to have their conditions monitored using equipment that they operate themselves.

In addition to recording and transmitting this "vital signs" data the patient is typically asked a set of pre-determined questions. They establish, in a simple and straightforward way, how the patient is feeling at that particular moment or capture other physical descriptions of living with their condition. Has there been any appreciable deterioration or improvement? How do they feel tackling the stairs or walking the dog, and has this changed between recorded readings? More focused still may be questions that invite them to describe characteristics such as the degree of tightness in their chest, swelling in their ankles or the colour of their sputum.

Some technologies incorporate patient education resources, either in a readable format or through the use of illustrative video case studies. This data and the patient's responses are sent to a secure "back end" system accessed only by those involved in the patient's care and by others (e.g. carers) authorised to see it.

The technologies

Some systems enable the patient to see a visual record of this data at individual points in time or more impactfully as trend data over time.

Where (and this should happen on every occasion) a care plan has been created between the patient and a clinician before the patient is recruited to a new service model incorporating Telemonitoring, the Telemonitoring equipment will be calibrated to trigger an alert if the patient's vital signs deviate outside agreed clinical parameters. The process may be refined over the initial weeks in which the technology is deployed. What is "normal" in the circumstances becomes a very personal standard.

This combination of time series trend data, tracking against agreed clinical parameters and the patient's answers to structured questions enables clinical intervention and a change in the treatment plan at the earliest opportunity where a patient's condition may be deteriorating or an exacerbation is imminent.

In addition, the patient can fully engage in, and actively manage, their condition. They can take the initiative and respond to any problems as they better understand the relationship between their behaviours (diet, exercise, well being), how they feel (subjective) and their health status (objective). The patient can be actively supported to make "lifestyle behaviour changes" through motivational coaching and other brief interventions. This additional support underscores positive lifestyle messages. The combination of technology, self and remote clinical management can monitor the patient's condition more frequently and consistently than would be the case through home visits, GP or outpatient appointments alone. In some contexts dealing with patient anxiety and providing reassurance can be as significant as relief of physical symptoms.

Why Telemonitoring?

"The key to effective COPD management has been early and active intervention with patients experiencing an infective exacerbation. Like many doctors, I care for a number of patients who, despite maximal inhaler therapy, experience repeat exacerbation of their breathing.

In the past I have prescribed antibiotics to keep at home should symptoms worsen, but patients have not had access to any precise information that could identify a change in their health.

I now use Telemonitoring.

Information such as PO2, temperature and pulse is shared routinely with the patient, and I am alerted to any deteriorating trends. Patients can now rely on real time data when managing their illness; they have gained control, and the feelings of isolation and anxiety associated with their long term condition has reduced.

I have greater assurance that I am neither over nor under treating patients with antibiotics or steroids, giving me the confidence to review patients by phone when once they required a visit to the surgery or a home visit."

Dr David Geddes NY&Y PCT

Telemonitoring is a recent addition to the options available for supporting people with long term conditions. It is both novel and a progression of what has always been at the core of high quality clinical consultation, the combination of empirical data and subjective experience of both the clinicians' and the patients'. Telemonitoring does not replace other methods of caring for patients but it does challenge the health and care system to respond in a more proactive, integrated and comprehensive manner.

It enables support to be provided to the patient – bespoke telephone advice, customised education material, appropriate expert face to face contact - as and when necessary. It adds new capabilities to healthcare services such as:

- It removes physical distance, allowing highest quality clinical support to be provided to the patient without clinician and patient being in the same physical location.
- It adds time series data enabling the development of a condition to be monitored against parameters and algorithms that check for problems more frequently and to positively trigger alerts when additional support is needed.
- It engages the patient directly in measuring the objective signs related to their own condition as well as the subjective symptoms providing a permanent comprehensive record of readings and feelings that can be reviewed and discussed with clinicians.

Through research, pilots and randomised control trials a great deal is now known about using Telemonitoring effectively. As new service models incorporating Telemonitoring are adopted more universally, its effectiveness will further increase, additional technical innovation will follow (e.g. mobile applications, wearable devices) and as unit costs fall, further efficiencies will be realised. We will also gain additional insights into the competencies and capabilities required within the healthcare workforce to deliver new service models most efficiently and with the highest levels of productivity. The ability for an independent nurse prescriber in receipt of Telemonitoring data to rapidly adjust the patient's medication delivers substantial efficiency gains; however, currently these roles/capabilities are not universally in place across the health system. Combining Telemonitoring data with a mobile first contact/community workforce enables more patients to be treated in priority need order and reduces travel and other overheads from wasted or non-essential journeys.

	Objective	Subjective	Sharing Expertise
Patient	Measuring Vital Signs	How I feel as I attempt to get on with activities of daily living?	Experiences of illness Social circumstances Attitude to risk Values Preferences
Clinician	Measuring Vital Signs	What in my professional opinion does the information available to me lead me to believe should happen next?	Diagnosis Disease aetiology Prognosis Treatment options Outcome probabilities
Carer (Informal/Formal)	Measuring Vital Signs	How does my loved one/client look/ sound/respond/ behave today?	Experience of caring

Types of Telemonitoring

A range of different types of Telemonitoring are available:

1. **Home Hub** A home Telemonitoring hub is connected to the patient's home telephone socket. It sends data to a central system via the Internet. The hub can gather data from devices such as spirometers, blood pressure monitors, glucometers, weighing scales, etc. It can also make enquiries of the patient via text based question trees on a screen, asking for example "How are you feeling?", "Have you noticed a change in the colour of your sputum?" The central system monitors readings and responses, alerting identified healthcare professionals if agreed parameters are exceeded.
2. **Home Hub with Supplementary Communications**. In addition to the core capabilities above, Telemonitoring with this technology also provides a voice or video consultation facility to a clinical professional or trained telecoach who can provide additional advice.
3. **Smartphone Based Remote Telemonitoring**. The patient inputs the measurements they have taken into a smart phone "app" that stores them along with previous reading for the patient to review and share with their GP or nurse. The remote system can monitor the patient's clinical measurements against parameters and offer advice back to the patient or send alerts to their healthcare professionals.

"It (Telehealth) stops me from going into hospital! Yesterday my blood pressure was slightly high and by half past nine they had rung (me) because they had seen it in the data".

Patient using Telehealth in NHS East Riding of Yorkshire

4. **Personal Telemonitoring**. Amongst the explosion of medical "apps" for smart phones are those that allow people to enter measurements for their conditions, for example blood pressure or blood glucose levels. Over time these measurements are graphed and this information can be used to self manage or to inform discussions with healthcare professionals.

Where the data is collected centrally, then it has potential supplementary uses for reviewing case management, planning services and for research.

A significant issue for continuity of care of patients is ensuring that the essential data collected and collated by Telemonitoring can be captured as a part of the patient's health record.

Case Example: The Whole Systems Demonstrator (WSD)

The NHS has been running one of the world's largest and most comprehensive studies of Telemonitoring and Telecare. The Whole System Demonstrator Programme is evaluating the impact across the whole system of introducing using service models utilising Telecare and Telemonitoring for people with COPD, Heart Failure and Diabetes. This study is using rigorous evaluation techniques and it will deliver a step change in the evidence base for Telehealth. It involves around 6000 patients and 600 carers in the three very different geographies chosen – Cornwall, Newham and Kent. Results are expected the end of 2011 onwards and will add further insights into a range of areas including the impact on utilisation of healthcare services, the economics of Telehealth, patients' experiences, patient reported outcomes and organisational implications.

Service Definition

Telemonitoring

To introduce new service models incorporating Telemonitoring effectively requires careful planning and service redesign. To realise greatest benefit it is important to take account of the whole health and care system as the necessary changes impact widely. Sometimes new innovations are deployed too rapidly and lead to setbacks. Conversely, truly scalable solutions do not emerge as new approaches remain marginalised and never become "How it's done around here!" Therefore, it is especially important to set realistic goals for each phase of a service transformation that align with local capacities for change whilst not losing sight of the need to move things forward as quickly as is practical to meet the QIPP challenge.

Confirming the strategic objective

At the heart of effective service models for people with long term conditions are a number of fundamental features and shared principles:

1. The goal of supporting a patient with long term conditions to maintain independence and live their life to the fullest is a shared goal between the individual (their carers) and the professionals who care for them.
2. With suitable relevant information a patient can become an expert in both their experience of living with the condition (completing the activities of daily living) and managing the condition.
3. An effective way of capturing shared objectives is through the creation of a care plan that details, amongst other things, the ambitions and motivations of the patient, their values and risk preferences as well as outlining from the clinicians perspective what is factually known about the patient's condition, the disease aetiology, prognosis etc.
4. Proactively identifying a potential exacerbation of the patient's condition and intervening to prevent it is, in everyone's best interests.
5. Where an exacerbation has occurred and the patient has been stabilised, maintaining the patient in that stable state is beneficial for their quality of life and impacts upon the intensity of the ongoing support they require.
6. At a population health level increasingly being able to predict which patients are likely to experience exacerbations and directing resources to prevent that occurrence is key to improving patient experience and conserving resources.
7. An integrated, comprehensive and personalised response – utilising health and care expertise – with clear professional accountability is most likely to meet the patients needs.

The role of Telemonitoring within this new landscape

Experience would suggest that there are very few health and care systems that have addressed themselves to delivering all of the changes (as outlined above) that are required to achieve maximum benefit from introducing new service models for people with long term conditions. Some of the insights themselves – for example on risk stratification, patient segmentation and predictive modeling – are the product of emerging disciplines which whilst increasingly authoritative are not yet definitive.

To achieve major strategic goals, clarity of purpose from the outset, driven by robust programme and project management, underpinned by comprehensive ongoing stakeholder engagement and communications is key.

As outlined later in the workbook, confirming the scope of the project and measuring outcomes and benefits realised in line with that scope is fundamental. Whilst the implications of tackling this agenda comprehensively do send shockwaves across the whole health and social care system, lessons can be drawn from the experience of those pioneers already starting to deploy Telemonitoring.

Lessons from the pioneers

Some stand out lessons would include:

- **Planning & change management**. The scale of change is significant and needs to be managed well if problems are to be minimised and benefits realised. Communication and the participation of all the stakeholders from the outset is key.
- **Confirmation of patient selection model**. Whether the model of patient recruitment will be driven from the current, known, high intensity user population or from an algorithm based upon predictive risk will be material to benefits realisation. The potential always exists, for example, to reveal unmet need.
- **Becoming the norm**. The vast majority of Telemonitoring deployments have begun as pilots to ensure that the new service models are sustainable, the business case is robust and that the overall direction of travel enjoys broad based support. The inherent weakness in this approach is that unless the ambition and plan for up-scaling the pilot is clearly articulated at the outset, securing major culture change and commitment to the undertaking can be difficult. Whilst a service change of this nature and magnitude should be continuously evaluated in real time and adapted as circumstances and local context alter, unflinching commitment from senior leaders, in particular to realise the high level programme goals, is critical. In this way it is clear that new ways of working are intended to become the norm. This will ensure a higher likelihood of sustainability.
- **Delivering the scale**. Closely related to the previous point is the fact that a number of the efficiencies anticipated from introducing new service models incorporating Telemonitoring are only realisable from a scale deployment. For example increasing the number of patients that a health care professional "actively manages" in priority need order is only possible if substantial numbers of patients are being recruited to a new service model. In addition, some of the "back office" efficiencies to be achieved through a Telemonitoring deployment require a constant volume of throughput or staff remain underemployed – delivering technical or clinical triage for example.

- **Service models**. A range of alternative service models incorporating Telemonitoring have been introduced differentiated in a range of ways (see next section for more detail). Addressing key questions:

    1. *Confirming the referring clinician and the first responder to an alert.*
    2. *Determining whether the aim of deploying Telemonitoring is avoiding first/subsequent non elective admissions or assisting discharge and supporting rehabilitation.*
    3. *Proposing to utilise home based or mobile technologies*

  all significantly impact the strategic vision and the steps to be taken to realise it.

- **Service bundles**. There is evidence from some deployments that a combination of Telemonitoring and Motivational Telecoaching can deliver additional benefits for the patient particularly with respect to the confidence to self manage, decreased condition related stress and increased medicines' compliance. However, to include this skill set within the core competencies of operational staff within a new service model requires training and development. Additionally, in respect to specific conditions, for example COPD ,where factors such as the weather have a significant impact on the patients' wellbeing, services should wrap this intelligence into the service bundle via, for example, the Met Office or other meteorological services.
- **Workforce capabilities**. New ways of working and new equipment need to be accompanied by training for those who will be involved both within the professional workforce and for users and carers.
- **Interoperability**. The data collected will need to be integrated into other applications. To facilitate this interoperability standards are under development. Though this process is not concluded it is important to think through what local integration will be essential and to future proof for interoperability by following national standards. Taking the relevant bits to deliver a minimum patient data set is more important than assuming all data points are critical.
- **Evaluation**. Telemonitoring is primarily a change to how services are organised and delivered rather than a technology deployment. So careful evaluation is essential. A range of evaluation approaches are available for Telehealth.
- **Procurement**. A wide range of alternatives are available ranging from procuring elements of a Telemonitoring service – kit; technical triage; clinical triage – to a full "managed service." A national procurement framework has been developed by Buying Solutions to assist in this process but additional expertise may be required.
- **Risk reward contracts**. There is increasing flexibility in the marketplace from suppliers (kit or managed service) with respect to the commercial terms of any contract ensuring that the commissioners are protected against obsolescence and that the supplier is able to secure a reasonable return for their initial research and development investment, their set up infrastructure costs and the ongoing costs of delivering a service.

- **A journey rather than a destination**. The body of knowledge for Telemonitoring is still developing and at this time those leading its deployment will not have all the answers but will have to structure service development to accommodate local experiences as they accumulate.

Building local support

There are a number of factors that can help build local support:

- **Understanding** – Through information, demonstrations and discussions to build understanding of the nature of Telemonitoring and how it works.
- **Identifying with the change** – Becoming aware of other local case studies helps people to identify themselves with the change to services.
- **Formal business cases** – Especially for those accountable for the allocation of funds, a carefully constructed and documented benefits or business case provides assurances that investing funds and time will be worthwhile.
- **An imperative to act** – There are strong reasons to progress with implementing Telemonitoring quickly. The needs of those with long term conditions combine with national agendas like QIPP.
- **Senior sponsorship** – As with other major changes, it is valuable to engage senior clinical and service leaders and gain their support and sponsorship.

> *"We held quite a number of meetings and just basically kept at it until the commissioners actually said that, yes, this does save money. The potential, the evidence out there, all proves the savings and the benefits to the patient and to care providers as well."*
>
> **Lisa Sargeson, Lifeline Operations Manager, NHS East Riding of Yorkshire**

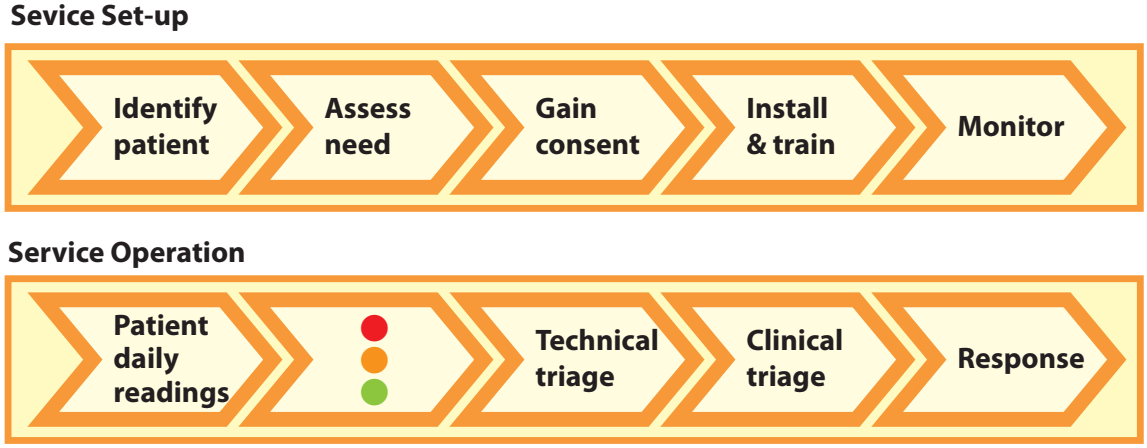
Delivering a Telemonitoring Service

There are no definitive clinical and operational guidelines for Telemonitoring service delivery and use at this stage. Large scale deployments will have to run for sustained periods to generate authoritative and widely accepted guidance. A code of practice exists for Telecare service providers and an equivalent is in development for Telemonitoring. In practice customisation and localisation will continue to be essential to realise the maximum benefits.

What is clear from current experience is that there are a number of core elements in any new service model incorporating Telemonitoring. These represent a good starting point for anyone designing and delivering Telemonitoring today.

Core Telemonitoring elements

The core elements of an operational Telemonitoring service are captured in the diagram below:



1. Identifying the patients that will benefit from Telemonitoring through referral or through analysis such as risk stratification.
2. Assessing the needs of each individual patient through a formal assessment of their condition and the creation of a care plan.
3. Matching the appropriate technology to the patient's needs and context e.g. home hub or mobile application, range of physiological measurements to be recorded, connectivity and route of transmission of data, automatic or self recording by the patient.
4. Gaining consent from the patient to the Telemonitoring services, and equipment installation.

5. Deployment/installation of Telemonitoring equipment and training the patient (and potentially the carer) in its usage.
6. Service commencement – this might include a "bedding in" process as the parameters for alert become better defined as what is "normal" for the patient becomes clearer.
7. Monitoring of the readings by the healthcare professionals via a clinical portal. Patients can also engage in managing their own condition through reviewing their data using a patient portal.
8. Alerts are generated automatically by the monitoring software where readings indicate a problem (e.g. by going outside of alert parameters).
9. Timely triage in response to alerts from the Telemonitoring system or from patients.
10. Responding to the alerts and intelligence – care provided to patients in priority need order - which might be a visit, telephone advice on how to manage their condition or adjustments to medications.

Support elements

Additionally some important elements are needed that do not impact patients directly but are critical to operate Telemonitoring services:

1. A support function is needed to receive, store, install, maintain, remove and sanitise the Telemonitoring equipment.
2. Initial and ongoing training and development for clinical staff.
3. Ongoing budgeting, monitoring, reporting and planning are needed to grow and develop the Telemonitoring service.

Alternative service models

Another consideration is the way Telemonitoring is being used. For long term conditions several service models are proving valuable:

1. Targeting it on patients at greatest risk of hospitalisation or exacerbation to help avoid these risks and manage their condition back to stability.
2. Using it to help patients whose long term condition is not advanced to modify behaviours and get their conditions under control. This can often be achieved by using Telemonitoring for a shorter period or in combination with health coaching.
3. Adding Telemonitoring to a patient's care plan after an emergency hospitalisation to help avoid readmission.

Each of these requires the same basic Telemonitoring service but deployed at different points in the progression of the patients' condition.

Duration

What is less clear currently is the "right" duration for a Telemonitoring deployment. Having access to a constant stream of relevant, high quality physiological and contextual data about a vulnerable individual, whether they have been newly diagnosed, are in the established phase of their illness or are recovering from an exacerbation post discharge, is unequivocally beneficial. The contribution that increased self management can make will be different because each individual will take a higher or lower level of responsibility for their own wellbeing and modify their behaviour accordingly. In terms of resource consumption and quality of life, we are endeavouring to avoid a pattern of exacerbation, stabilisation, decline, repeated until the end of a person's life.

Outside of chronic disease management, for example for the monitoring of individuals in withdrawal from substance dependency, the ability to remotely monitor their vital signs rather than maintain a 24/7 vigil is time limited and discrete. As a number of patients with chronic diseases will now be managing their condition with drugs for the rest of their lives it is possible, particularly when the technology becomes low cost and least invasive, that Telemonitoring will become a constant feature of the management of certain conditions. Some service models are experimenting with time limited deployments of Telemonitoring stepped down to self recording of vital signs data by the patient who retains peripheral devices (scales, pulse oximeters etc.); augmented where required with ongoing coaching and education. The business case remains robust if the alternative is a pattern of recurring exacerbation and admission at a high cost to both the individual and the taxpayer.

Key Benefits

Consideration of the benefits case

The benefits case for the introduction of new service models incorporating Telemonitoring is complex because of the many different variables involved:

- Patient selection and the importance of achieving behavioural change
- The challenge of identifying direct cause and effect (particularly proving that something with a high probability – a hospital readmission – did not occur)
- The significant changes that must occur in care processes and workflows to deliver QIPP benefits – quality, efficiency, expenditure, patient experience

In addition, we are continuing to learn through experience about key issues such as how to match the appropriate technology to a particular condition or individual, or the combined benefits of having a mobile community workforce receiving patient specific clinical trend data that enables them to prioritise their workload and actively case manage in real time.

In financial terms, the price points of the technology may be artificially high to enable manufacturers to reasonably cover their research and development expenditure whilst we still do not have truly volume sales. Technology providers are however increasingly flexible in looking at leasing arrangements, risk/reward contracts and contract duration.

There is also a significant distinction in the NHS between more efficient service provision and the generation of cash releasing savings.

In the light of all of the above, it is essential that there is a clearly articulated vision of the desired objectives and benefits across the local care economy from the outset and that the respective stakeholders understand the relationship between the scale of the undertaking and the benefits that will accrue in the system and to them individually. There also needs to be a great deal of flexibility and sophistication in capturing the benefits, as trade-offs often exist between near term goals and longer term objectives. If, for example, the current nursing workforce does not have independent prescribing rights the time and investment required to equip the staff with this additional skill set may be out of sync with the timeline to remodel the service incorporating Telemonitoring. Conversely, if there is a high level of patient awareness of self care strategies – a DAFNE programme with Diabetics for example - then equipping patients to embrace a new service model incorporating Telemonitoring may occur in double quick time.

This points once again to the criticality of context and ambition. Whilst there is enough evidence now to support the view that financial savings can be achieved in a relatively short period of time if high volume service users are successfully recruited to a new service model incorporating Telemonitoring, sustained benefits will accrue only if major service redesign is embarked upon.

Deploying Telemonitoring

The potential benefits of Telemonitoring are understood best for the major long term conditions where clinical outcomes, patient experience and economic benefits are all positive. However, because some of the benefits arise in different parts of the system to that where costs are incurred, some reshaping of budgets may be needed and investment is usually needed to develop Telemonitoring services ahead of the benefits becoming available. Overall the benefits case becomes stronger as Telemonitoring services achieve scale.

How do patients respond to Telemonitoring?

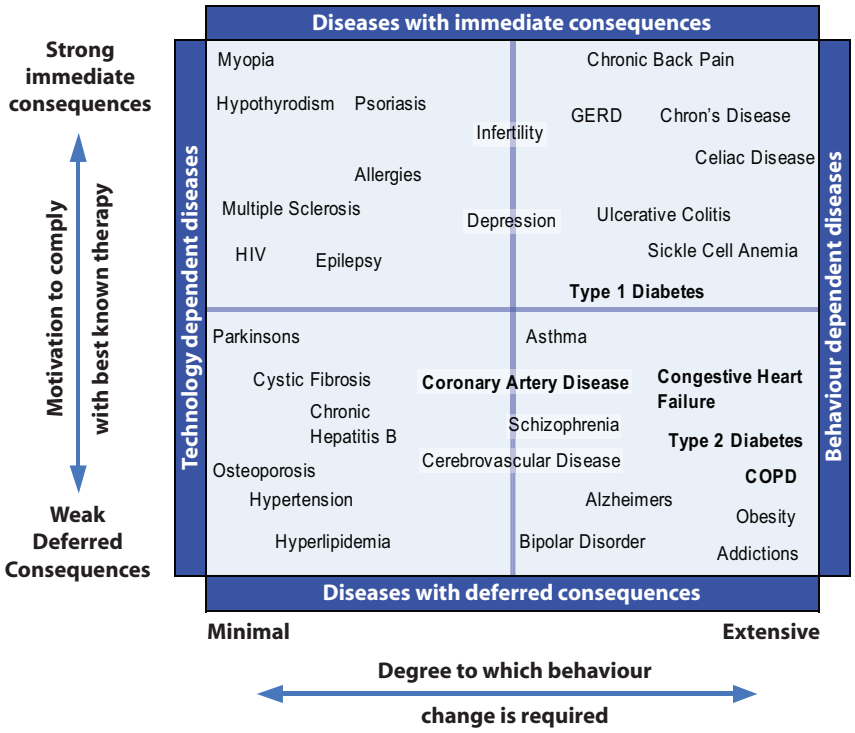
The majority of patients with long term conditions respond very well to Telemonitoring and are enthusiastic about its value and the benefits it provides. A minority does decide not to accept the equipment and some do not use it fully. Generally, people report improved quality of life from Telemonitoring, increased self awareness and confidence, and greater satisfaction with the healthcare services they receive.

Behavioural change

Analysis of diseases by Professor Clay Christensen and his team at Harvard highlights the relationship between the degree to which a patient's behaviour needs to change to positively impact on their health status and the patient's short term motivation to comply. The core long term conditions of COPD, CHD and diabetes share the characteristics that the disease has deferred consequences but its positive management requires immediate behaviour change. As a patient on Telemonitoring is necessarily an active and engaged participant in their own care this provides a fertile opportunity to initiate meaningful and sustained behavioural change.

> *"Our patients say they feel more empowered when they have information they need to better manage their conditions. The use of Telehealth technology to monitor their daily health also means they can better spot when their health might be about to deteriorate and help us deliver rapid support which will often avoid the need for a hospital admission."*
>
> **Dr David Rooke, Bridgwater GP Surgery**

Chronic Quadrangle: Behaviour intensive diseases with deferred consequences



Source: Christensen, Grossman, Hwang (2009) *The Innovator's Prescription*

Benefits by long term condition

Appendix B provides a set of pointers into the research and case studies for Telemonitoring for LTCs. In summary, the benefits of Telemonitoring for COPD, CHD and diabetes are:

COPD	CHD	Diabetes
• Reductions in exacerbations • Improved self management • Better coping with symptoms • Reduced hospitalisations • Fewer A&E visits • Reduced GP consultations • Reduced community nurse visits	• Lower one year mortality rates • Reduced hospitalisations • Shorter hospital stays • Improved adherence to medications • Reduced GP consultations • Reduced nurse visits • Improved self management	• Improved management of blood glucose levels • Improvements in cholesterol and blood pressure • Better adherence to blood glucose monitoring regimes and retinal & foot examinations • Less use of hospital services • Lower prescribing costs

So across all the major long term conditions there are important benefits available from Telemonitoring.

Benefits by stakeholder group

As with any change to healthcare, there is work, up-front, to develop Telemonitoring services that falls disproportionately on healthcare leaders, professionals and staff. But unusually the benefits are widely available and all stakeholders potentially benefit over the full life cycle of a Telemonitoring initiative. The following table highlights the major benefits for the key stakeholder groups:

Patients & their carers	• Improved management of their long term conditions. • Fewer hospitalisation and less usage of healthcare. • Feel better supported and in more control.
Community care nurses	• Better monitoring of patients with more timely information. • Ability to schedule visits to focus on the most urgent cases. • Reduction in unnecessary travel and home visits.
GPs	• Improved monitoring of patients' conditions • Better information for diagnosis and management • Fewer surgery consultations • Fewer hospitalisations
Commissioners	• Lower overall costs of LTC care • Increased data for planning services and population health • Higher patient perceptions of the quality of health services
Social care	• More information available to co-ordinate care • Ability to combine telecare services with telehealth
Researchers & public health	• In time, new and richer datasets on the progression of long term conditions for research and for planning health initiatives
Policy makers	• Potentially a major contribution to health improvement • Telehealth services that can be built upon into the future

Realising the benefits

Carefully identifying the benefits and planning in detail will be key for their realisation. Evaluating how well the intended benefits are being delivered and taking any corrective actions needed are also essential. Without a focus on benefits realisation, the benefits may not be fully realised and that is particularly true where improvements are focused on relieving capacity constraints or realising cash savings when these are critical to driving forward further expansion of Telemonitoring services.

Case Example: NHS Direct's COPD Telehealth Pilot in SE Essex

A promising pilot was conducted in 2009 by NHS Direct of Telemonitoring with 80 COPD patients in Essex. Whilst care must be taken not to simply scale up results from a pilot to larger scale initiatives their work adds to the evidence for Telemonitoring for COPD delivering significant clinical, patient and economic benefits. They reported significant reductions in emergency admissions to hospital (83%); reductions in 999 calls (72%) and GP visits (56%). This pilot was led by Community Matrons and used health advisors at NHS Direct to monitor the Telemonitoring data and escalate problems to the Community Matrons. This arrangement led to significant savings in Community Matron time on visiting patients at the level of approx. 0.25 FTE per 50 COPD patients. The overall ROI over a three year period was very positive easily suggesting a strong business case for scaling Telemonitoring for those COPD patients at risk of hospitalisation.

An Eye to the Future

At all levels of the NHS there is general optimism surrounding Telemonitoring and a growing ambition to make appropriate use of these new technologies in the care of people with long term conditions.

There are also some powerful forces set to make Telemonitoring generally more deployable:

1. The costs of the information technologies that underpin Telemonitoring are falling.
2. The techniques, data and analytics to identify how best to target Telemonitoring and to be able to effectively evaluate it are now well developed and easier to employ.
3. The growing pressure on services from increasing numbers of people with long term conditions needing treatment from an NHS that is constrained to modest levels of growth make it increasing essential to use capacity and capability to best effect.

The research and development needed to make Telemonitoring effective is in place for the major chronic conditions and to underpin the basic service models, but more will be learnt and refined as Telehealth develops within the NHS and comparable healthcare systems in Europe and the USA.

As the public increasingly use Information Technology in their daily lives enthusiasm for value adding technology grows. In due course there will be an expectation that Telemonitoring will be generally available. For healthcare professionals there is much to learn and considerable work to be done to bring about the benefits at scale, but the pioneering work has been done and can be built upon to unlock the potential from these new service models exploiting the potential of Telemonitoring.

On the horizon, Telemonitoring technologies will be worn and indeed some "smart" monitoring pills will actually be ingested by the patient. With a greater pressure on the available clinical and care workforce, physical face to face contacts will have to be value added. New services incorporating Telemonitoring will enable us to rebalance the healthcare system, using inpatient beds appropriately for the critical phase of an individual's illness, with effective monitoring and care in the community the norm for the majority of the rest of the time.

Case Example: DALLAS

DALLAS, launched in June 2011 looks likely to take Telehealth to new levels of scale within the UK and accelerate the pace at which it will become a mainstreamed component of health and care services. DALLAS stands for Delivering Assisted Living Lifestyles at Scale and is an initiative from the Technology Strategy Board, the UK's government agency for innovation. The project is investing over £23 million over three years and is aiming to result in a set of projects that will bring the benefits of Telecare and Telehealth to a minimum of 50,000 people across the UK. DALLAS and other initiatives look set to continue the scaling and then mainstreaming of Telemonitoring.

Appendix A Checklist

This list aims to provide service professionals and managers with a set of questions to stimulate planning and decisions ahead of expanding their use of Telemonitoring. The questions are most appropriate for a service team or organisation considering major adoptions of Telemonitoring or who wish to build on the success of small deployments or pilots.

1. Service Planning for Telemonitoring				
No.	**Question**	**How Well Addressed?**		
		Not addressed	Partially	Fully addressed
1.1	Is the understanding of Telemonitoring amongst key people sufficient to allow further adoption to progress confidently to implementation?			
1.2	Have opportunities to tap into the experience of others and into best practice been identified?			
1.3	Is there an understanding of the need for Telemonitoring and how it will benefit the services? Has risk stratification been used to identify patients with long term conditions and co-morbidities who could benefit from Telemonitoring?			
1.4	Has the referral process been developed and agreed?			
1.5	Are there ways to involve and consult the key stakeholder groups to ensure they are bought into the changes needed?			
1.6	How will the changes to service models be identified and any workforce implications identified and worked through?			
1.7	Are the broad technology options understood?			
1.8	Are the needs of various stakeholder groups to evaluate the outcomes from Telemonitoring broadly appreciated and can be met?			
1.9	Is the strategic business case for expanding Telemonitoring clear and the decision making needed to gain authorisations understood?			

2. Service Design				
No.	**Question**	**How Well Addressed?**		
		Not addressed	Partially	Fully addressed
2.1	What is the new service model you are trying to introduce and what role will Telemonitoring play?			
2.2	How will Telemonitoring equipment and any external services be selected and procured?			
2.3	Is there a broad understanding of any additional support staff that will be needed and the processes for sourcing them?			
2.4	How will we identify the training needs for staff?			
2.5	What marketing and PR activities are required to communicate well?			

3. Setting Up The Services				
No.	**Question**	**How Well Addressed?**		
		Not addressed	Partially	Fully addressed
3.1	Can we identify those individuals who are most likely to benefit from Telemonitoring (e.g. using risk stratification)?			
3.2	Are we able to identify patients likely to experience a large number of exacerbations and focus Telemonitoring support for them?			
3.3	How will we recruit patients who are prepared to use Telemonitoring within their model of care?			
3.4	How will we identify and meet the needs of those people who are unable or unwilling to adopt Telemonitoring as part of their care?			
3.5	Are we able to develop the processes to survey patients' homes for Telemonitoring equipment and to safely install it?			

4. Service Operations				
No.	**Question**	**How Well Addressed?**		
		Not addressed	Partially	Fully addressed
4.1	How will we ensure we deliver and install the Telemonitoring services and ensure patients are able to use it well?			
4.2	What is needed to ensure that the Telemonitoring data is being collected reliably and is accurate?			
4.3	What will the protocols be for responding to alarms from the Telemonitoring systems?			
4.4	How will patients advise care services and GPs of concerns being highlighted by Telemonitoring data or questions?			
4.5	Are any changes needed to processes for escalating clinical responses?			

5. Service Operations				
No.	**Question**	**How Well Addressed?**		
		Not addressed	Partially	Fully addressed
5.1	How will the service be performance managed and evaluated?			
5.2	Will any changes to service governance be needed?			

Appendix B
Regional Telehealth Hub Resource

Introduction

The NHS in Yorkshire and Humber, through the Regional Innovation Fund, has invested in an integrated virtual operational model – the Telehealth HUB. The Telehealth HUB will be a single access service provided by regional partners – Airedale NHS Foundation Trust, NHS Barnsley, University of Hull and East Yorkshire NHS Trust, South West Yorkshire Mental Health Trust, NHS Yorkshire and the Humber and Yorkshire and Humber HIEC – who have specialised in the provision of Telehealth services.

The Telehealth HUB will offer a "menu" of clinical services to commissioners and providers within the region, Teleconsultation, Telemonitoring and Telecoaching delivered remotely.

About the HUB

The Telehealth HUB will provide:

- A clinical triage service for patients using Telemonitoring (receiving, monitoring and triaging data and referring patients onwards if appropriate).
- A clinical triage service for patients using Teleconsultation (receiving calls from patients, providing expert clinical triage and referring onwards appropriately, either back to local support or clinical support provided via the HUB).
- A scheduled outpatient appointments service for patients using Teleconsultation.
- A technical triage service for patients using Telemonitoring and Teleconsultation
- A Telecoaching service.
- A central resource for innovative thinking, awareness raising, capability and capacity building for projects wishing to utilise Telehealth.

For further details please contact Jenny Jackson – HUB Project Manager at jenny.jackson@yorksandhumber.nhs.uk

Appendix C
References, Resources & Contacts

Key sources of evidence for Telemonitoring for long term conditions

COPD

- Polisena, et al. "Home Telehealth for Chronic Obstructive Pulmonary Disease: A Systematic Review and Meta Analysis", Journal of Telemedicine and Telecare, 16 (3) pp 120-7, 2010
- NHS Direct, "At Home, not Alone: COPD Telehealth Project Final Evaluation", February 2010

CHD / CHF

- Inglis, et al. "Structured Telephone Support and Telemonitoring Programmes for Patients with Chronic Heart Failure", Cochrane Database of Systematic Reviews, 2010, Issue 8, Article Number CD007228

DIABETES

- Polisena, et al. "Home Telehealth for Diabetes Management: A Systematic Review and Meta Analysis", Diabetes, Obesity and Metabolism, 11(10), pp 913-30, 2009

Regional resources for Telehealth

- **e-Learning: An Introduction to Telecare and Telehealth**
  An introductory module developed by experts from the Advanced Digital Institute, Y&H HIEC, University of Hull and Sheffield Hallam University
  url: http://www.telesolutionsea.co.uk/
- **Yorkshire & Humber Telehealth Toolkit**
  An on-line resource of telehealth information, contacts, cases, documents and links.
  url: http://yhhiec.org.uk/telehealthtoolkit/
- **NHS North Yorkshire & York Telehealth Website**
  http://www.nyytelehealth.co.uk/

Regional video case studies on Telemonitoring

- NHS Barnsley
  http://yhhiec.org.uk/yhtoolkit_content/MOVIES/Barnsley/MOVIE_Barnsley.html
- NHS Doncaster
  http://yhhiec.org.uk/yhtoolkit_content/MOVIES/Doncaster/MOVIE_Doncaster.html
- NHS East Riding of Yorkshire
  http://yhhiec.org.uk/yhtoolkit_content/MOVIES/East_Riding/MOVIE_East_Riding.html
- NHS Hull
  http://yhhiec.org.uk/yhtoolkit_content/MOVIES/Hull/MOVIE_Hull.html

Other UK resources for Telehealth

- Whole Systems Demonstrator Action Network (WSADN) – on line information source on Telehealth research, education and experience
  http://www.wsdactionnetwork.org.uk/about_wsdan/index.html
- Procurement Framework for Telecare, Telehealth and Telecoaching at Buying Solutions
  http://www.buyingsolutions.gov.uk/categories/ICT/telecare/
- West Midlands NHS Telehealthcare business case toolkit
  http://nhslocal.nhs.uk/story/inside-nhs/telehealthcare-toolkit

Support for Telehealth for long term conditions

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Appendix D
Document Control

Title	Telemonitoring for Long Term Conditions: A workbook for implementing new service models.
Author	Dr Paul Rice
Publication Date	October 2011
Document Purpose	Distribution of knowledge and information on healthcare innovation and practice.
Target Audience	Clinicians, professionals, managers and staff involved in the development and delivery of services for long term conditions.
Description	This document provides a general introduction to the use of Telemonitoring to improve health and care services for patients with long term conditions.
Contact Details	**Dr Paul Rice** Telehealth Lead Health Innovation and Education Cluster (HIEC) Yorkshire and the Humber Direct Dial: 0114 2714344 Mobile: 07766 763 742 Blackberry: 07876 476529 e-Mail: paul.rice@sth.nhs.uk

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