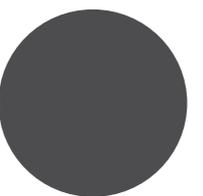




# TECHNOLOGY ENABLED CARE SERVICES

Resource for Commissioners

January 2015



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# INTRODUCTION

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## NHS COMMISSIONING ASSEMBLY FOREWORD

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Our ambition as commissioners is to secure high quality care for all – now and for future generations. As demand for health and social care continues to rise, we know that to achieve this the NHS needs to evolve and develop new models of care that provide better coordinated and integrated primary, community, hospital and social care services.

NHS England's **Five Year Forward View** sets out the changes we need to make to provide high quality care for patients, promote wellbeing, prevent ill health and reduce health inequalities. And for the first time, we as commissioners have been asked to plan on a five year trajectory, enabling us to take a long term strategic approach to developing commissioning plans. This gives us the opportunity to be innovative and ambitious in how we plan to help all people to stay healthy and avoid complications. Technology enabled care services can be an effective tool in supporting people to manage their own health and enabling better coordination of care, personalisation and prevention.

Technology alone can't deliver a transformation in care, but when embedded in a wider package of care and new ways of

working, the combined innovation can have a powerful impact on improving patient outcomes and reducing inequality. That is why planning for technology enabled care services needs to take place at a whole health economy level and involve health, social care, voluntary services, patients and carers.

As commissioners, we want the opportunity to innovate and improve services to achieve the best outcomes for the people we serve. To do this, we need support and information about how to develop and design services that take advantage of new and emerging technologies – that is what this TECS commissioning toolkit provides.

This resource, developed by commissioners from the Quality Working Group of the Commissioning Assembly, will I hope encourage all of us – health and social care commissioners at a local and national level – to learn from each other and work together to secure better value for money services and achieve improved outcomes and reduced inequalities for patients, citizens and carers.

**Dr Peter Melton**

Co-Chair NHS Commissioning Assembly

## NHS ENGLAND FOREWORD

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The Technology Enabled Care Services Resource for Commissioners has been developed by NHS commissioners to identify practical tools that can help maximise the value of technology enabled care services for patients, carers, commissioners and the whole health economy.

Technology has the power to radically transform the way we deliver healthcare by enabling all patients to take a more active role in their own health and increase prevention through supported self-care. By capitalising on new and emerging technology we have the opportunity to provide a modern model of continuous, coordinated care centered on the individual, with professionals acting in partnership with

the person to improve their health and wellbeing. The **National Information Board's Framework for Action - Personalised Health and Care 2020** sets out the ambition to harness the power of technology to provide better, safer and sustainable care.

I believe that by embracing rapidly emerging mobile and health care we can empower millions of patients to own their own care and transform the way we plan and deliver services to create a sustainable NHS for the future.

**Professor Sir Bruce Keogh KBE**  
National Medical Director, NHS England

## AUDIENCE AND PURPOSE

### What is TECS?

The term 'technology enabled care services' (TECS) refers to technologies (such as telecare, telehealth, telemedicine/teleconsultation and self care apps) that help people to manage and control chronic illness and sustain independence. They enable the remote exchange of information, primarily between a patient or citizen and a health or care professional, to assist in diagnosing or monitoring health status or promoting good health. The TECS programme aims to empower patients and citizens and support them to take greater control of their own health and care, working in partnership with health and care professionals, families, carers and the voluntary sector. Some TECS, such as telecare, are already well established within the social care and housing sectors. These are often supported through Integrated Community Equipment Services (ICES) schemes, although many are increasingly self-funded.

The Better Care Fund and the Care Act bring new opportunities for collaboration, earlier assessment, information, advice and guidance in the delivery of high quality social care services. This will include supporting people to self-care and self-manage through use of their own resources, developing the retail market as well as encouraging the use of personal health budgets for TECS. NHS England has set out plans for the new **Integrated Personal Commissioning Pilots** which will be available from April 2015.

### Who is this toolkit for?

This toolkit is for all commissioners of health and care services, including NHS England, clinical commissioning groups (CCGs) and local authorities and providers of health and social care. Commissioners will work with their provider community to define the types of services their populations need, including those enabled by information technology. They can also play an important role in joint planning and investment in technology across a local health economy (LHE). Commissioners should work with providers to ensure eligible patients with long term conditions (LTCs) are offered a personalised care plan which may outline the need for access to digital information and TECS.

The toolkit will also be of interest to people working in partnership and providing support to commissioners, including health and wellbeing boards, Commissioning Support Units (CSUs) and providers of health and social care, who have plans for TECS and wish to seek support from their commissioner.

## AUDIENCE AND PURPOSE

### What is this toolkit for?

This toolkit is the first component of a suite of resources we are developing on implementation, procurement, measurement and improvement. It provides practical tools to help commissioners and their delivery partners to:

- Select, procure, deploy and measure TECS effectively to transform care pathways and deliver the most appropriate care for patients.
- Map, understand and harness the potential of resources already available within the local health economy.
- Implement local innovation and commissioning practices that are responsive to rapid advances in technology and enable increasing digital maturity.

### The advice in this toolkit aligns with the steps in a typical commissioning cycle. It tackles the following questions:

- How can commissioners maximise the benefits of TECS to achieve levels of ambition in improved social care and health outcomes, particularly in preventing and managing chronic illness, effectively sustaining independence as people age and averting admission to acute and institutional care?
- How can TECS be used to meet the changing needs of current and future patients and their carers?

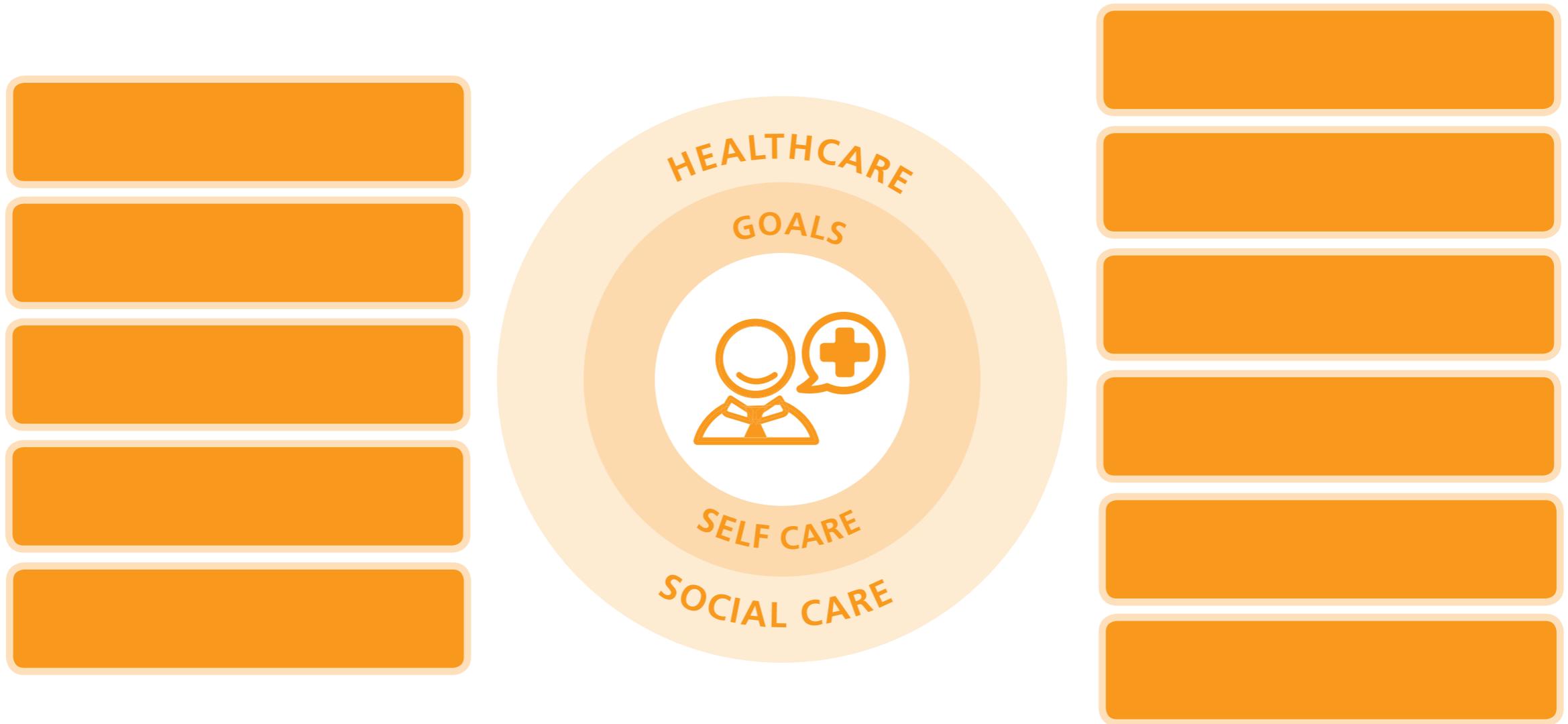
- How can TECS support new models of care that deliver transformation in quality and efficiency?
- How can TECS enable a commissioning model that empowers patients and citizens to manage their own care in a way that best suits them?
- What opportunities does TECS present in the commissioning and delivery of primary care?

### How will this toolkit help me?

TECS can help deliver NHS, local authority and voluntary and independent sector services more effectively and efficiently. The toolkit equips commissioners to:

- Be aware of the wide range of TECS available, how they support commissioning intentions, and the benefits they can bring to patients, commissioners, families, health and care professionals and provider managers.
- Collaborate with their provider communities to unlock the potential of TECS in supporting continuous improvement in the quality of care.
- Set the TECS strategy in their locality, oversee and scrutinise TECS implementation plans, ask the right questions to seek assurance, provide focused advice and guidance on delivery and ensure effective evaluation.

## POLICY CONTEXT



## POLICY CONTEXT

### NHS and Adult Social Care Outcomes Frameworks

TECS can help address objectives to improve health and care outcomes. The **NHS Outcomes Framework** identifies enhancing the lives of people with long term conditions as one of the outcomes the NHS should improve. The government's **Mandate** tasks NHS England with the challenge of making 'significant progress towards three million people with LTCs being able to benefit from telehealth and telecare by 2017'. The **Adult Social Care Outcomes Framework** includes an objective to ensure people receive care, when it is needed, in the most appropriate setting and in a way that enables them to regain independence.

The NHS Five Year Plan

New models of provision

Urgent and Emergency  
Care Review

7-Day Services

NHS and Adult Social  
Care Outcomes Frameworks

Integrated Health and  
Care 2020

Integration of care

Health budgets

Health and social  
integration

Adult Social Care Fund

Health and Social Care Act

## POLICY CONTEXT

### New models of primary care

Technologies designed to enable the remote monitoring of health status and collect information that can inform treatment plans, can act as a powerful tool in the coordination and delivery of primary care. The **Improving General Practice Phase One Report** states: 'Coupled with the highly systematic use of technology to support the management of LTCs and track changes in health status, general practice can play a central role in providing support for people with chronic disease, and in identifying those at risk of developing ill health.' TECS has tremendous potential to:

- enable self care;
- anticipate need and prompt early intervention;
- exchange information between organisations;
- coordinate care as patients transition between providers;
- highlight when citizens are at risk and need help; and
- enable secure communications between providers and their patients and families.

## POLICY CONTEXT

### Urgent and Emergency Care Review

When used as part of the right package of care, TECS can support people in such a way that unnecessary visits to urgent and emergency care departments and admissions to hospital are avoided. This enables professionals to care for those most in need.

The NHS Five Year F

New models of pr

Urgent and Em  
Care Review

7-Day Serv

NHS and Adult S  
Outcomes Fram

Used Health and  
Care 2020

isation of care

health budgets

n and social  
integration

ter Care Fund

e Care Act

## POLICY CONTEXT

### 7-Day Service

TECS offers an opportunity to deliver care to people in more efficient ways, particularly those that live in remote and rural areas. It can support the shift towards providing patients with access to some health and care services, seven days a week to reduce variation when patients receive care<sup>1</sup>.

<sup>1</sup> See **NHS Everyday** for more information about how NHS England is moving towards routine NHS services being made available seven days a week.

## POLICY CONTEXT

### Health and social care integration

Assistive technologies, which enable remote communication between patient and clinician or provide remote rehabilitation packages, can improve a person's quality of life by supporting them to live independently and tackling social isolation. The Department of Health refers to the contribution of technology in achieving **better integrated health and social care**. Integrated care pioneer sites are increasingly looking to TECS as an essential component of health and social care pathways. TECS allows for better sharing of information to support integrated, joined-up care and faster communication and turn-round times across the health and care community. Secondary, primary, community care, mental health, the voluntary sector and local authorities can share TECS to synchronise the delivery of care. The Prime Minister's Challenge Fund: Improving Access to General Practice invites practices to submit bids for delivering general practice in innovative ways and the first wave pilots have demonstrated how TECS can contribute.

The NHS Five Year F

New models of pr

Urgent and Em  
Care Review

7-Day Serv

NHS and Adult S  
Outcomes Fram

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Care 2020

isation of care

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n and social  
integration

ter Care Fund

e Care Act

## POLICY CONTEXT

### Personalisation of care

TECS can empower patients to take control of their own care in a way that suits them, when identified through personalised care plans<sup>1</sup>, working together to identify outcomes and the most appropriate services and support to achieve them. The remote exchange of health and care data from patient to professional can bring peace of mind and a great sense of ownership, as well as encourage healthy behaviours and a more proactive approach to healthcare, self-care and self-management.

<sup>1</sup> Transforming Participation in Health and Care, Guidance for Commissioners

## POLICY CONTEXT

### Personal health budgets

Integrated personal commissioning and personal health budgets<sup>1</sup> may also provide an opportunity for individuals to fund assistive technologies as part of an integrated care and support package. NHS England has set out plans for the new **Integrated Personal Commissioning Pilots** which will be available from April 2015.

<sup>1</sup> See the Personal health budgets [website](#) for information and news about the Department of Health's personal health budgets policy and a learning network for NHS and social care professionals involved in personal health budgets. See also NHS England's **Integrated Personal Commissioning Prospectus**, 2014.

## POLICY CONTEXT

### The Better Care Fund

The £3.8 billion Better Care Fund creates a local, single pooled budget to incentivise the NHS and local government to work more closely together around people in order to make their wellbeing the focus of health and care services. Many local areas have identified telehealth, telecare and similar technologies as key elements of their **Better Care Fund plans**.

The NHS Five Year Plan

New models of provision

Urgent and Emergency  
Care Review

7-Day Services

NHS and Adult Social Care  
Outcomes Framework

Integrated Health and  
Care 2020

Integration of care

Health budgets

Health and social  
integration

Better Care Fund

The Care Act

## POLICY CONTEXT

### The Care Act

The **Care Act 2014** sets out how local authorities can build services based on the needs of the individual. Local authorities have a duty to consider the physical, mental and emotional wellbeing of the individual needing care, and the Department of Health has made a commitment to make joined-up health and care the norm by 2018. TECS can play a key role in supporting more joined-up, continuous care and support.

Joined Health and  
Care 2020

Integration of care

Health budgets

Health and social  
integration

Local Care Fund

The Care Act

The NHS Five Year Plan

New models of provision

Urgent and Emergency  
Care Review

7-Day Services

NHS and Adult Social Care  
Outcomes Framework

## POLICY CONTEXT

### The NHS Five Year Forward View

The NHS Five Year Forward View

New models of primary care

Urgent and Emergency  
Care Review

7-Day Services

NHS and Adult Social Care  
Outcomes Framework

The NHS **Five Year Forward View** highlights the actions needed to drive improvements in health and wellbeing, quality and efficiency. TECS can be a key enabler for a number of these actions, including:

- Targeted prevention through the continuous remote monitoring of vital health signs which can detect a downturn in the patient's health before it becomes a serious exacerbation.
- Empowering patients and supporting people to manage their own health by giving them access to real-time data.
- Supporting people to stay in employment by reducing the amount of time they need to spend in hospital or at GP appointments.
- Driving efficiency by moderating demands on hospital care.
- Supporting the delivery of new models of care that are coordinated around patient need and combine their physical health, mental health and social care needs.

Shared Health and  
Care 2020

Integration of care

Health budgets

Health and social  
integration

Local Care Fund

Health Care Act

## POLICY CONTEXT

### The National Information Board

The **National Information Board's Framework for Action - Personalised Health and Care 2020** sets out what we can start doing across the system to create the conditions for local organisations to make better use of information and technology. TECS supports a number of the proposals set out in the NIB framework, including:

- Enabling individuals to make the right health and care choices through supported self-care, and telecoaching and self-care apps that support behaviour change.
- Giving care professionals and carers access to all the data, information and knowledge they need – through real-time digital information on a person's health status.
- Supporting care professionals to make the best use of data and technology – by supporting members of the health, care and social care workforce to develop the knowledge and skills to embrace the opportunities of information.
- Assuring best value for taxpayers – by encouraging the use of technologies that reduce the cost and improve the value of health services.

# WHY IS TECS RELEVANT TO COMMISSIONERS?



## WHAT IS TECS?

**TECS involves the use of technology to enhance care by capturing and sharing information in new ways.**

The TECS programme aims to deliver better outcomes for patients by maximising the value of technologies that enable better communication between the patient, their carers and their care team. These technologies include:



### Telehealth

Remote monitoring of patients in their own homes to anticipate exacerbations early and build their self-care competencies.



### Telecare

Technologies in the citizen's home and communities to minimise risk and provide urgent notification of adverse events.



### Telemedicine/ teleconsultations

Remote peer-to-peer support between clinicians and/or consultations between patients and clinicians.



### Telecoaching

Telephone advice from a coach to support people by building knowledge, skills and confidence to change behaviours.



### Self-care apps

Applications that raise awareness and help people self-manage.

These technologies complement services such as integrated digital care records and unified communications between health and social care teams. They also complement the use of Integrated Community Equipment Services (ICES) and the growing adoption of technologies in communities through the retail market. The National Information Board will publish proposals on the regulation, accreditation and kitemarking of technology of data-enabled services, including apps, by June 2015. The intention is to support innovation, consumer and professional confidence, and to enable GPs to be able to prescribe these technologies.<sup>1</sup>

<sup>1</sup> Personalised Health and Care 2020: A Framework for Action

## HOW WILL USE OF TECHNOLOGY ENABLED CARE SERVICES SUPPORT THE SEVEN NHS COMMISSIONING LEVELS OF AMBITION?

The planning guidance document 'Everyone Counts' asks commissioners to outline seven specific areas against which they should set levels of ambition for improving health outcomes.

TECS should be routinely considered in the design and commissioning of any care pathway. There are examples from across the country of TECS projects that support achievement of the NHS levels of ambition.

- 1 Securing additional years of life for the people of England with treatable mental and physical health conditions.
- 2 Improving the health-related quality of life of the more than 15 million people with one or more LTCs, including mental health conditions.
- 3 Reducing the amount of avoidable time people spend in hospital through better and more integrated care in the community, outside of hospital.
- 4 Increasing the proportion of older people living independently at home following discharge from hospital.
- 5 Increasing the number of people with mental and physical health conditions having a positive experience of hospital care.
- 6 Increasing the number of people with mental and physical health conditions having a positive experience of care outside hospital, in general practice and in the community.
- 7 Making significant progress towards eliminating avoidable deaths in our hospitals caused by problems in care.

## HOW CAN TECS SUPPORT INTEGRATED HEALTH AND SOCIAL CARE?

TECS supports an individual's health and social care needs from birth to death. It can enable providers across the health and social care system to give better access to care, improve communication, and enhance teamwork and efficiency. It can also support self-care.

Wellness

Complex Multiple Long Term Conditions

<b>Pregnancy &amp; first year of life</b> Conception to age 1 700,000 births	<b>Childhood</b> Age 1 – 11 6.5m people	<b>Adolescence</b> Age 12 – 16 3m people	<b>Young Adulthood</b> Age 17 – 39 16m people	<b>Middle Age</b> Age 40 – 64 17.4m people	<b>Older Years</b> Age 65+ 9.3m people
<p><b>Telehealth</b> monitoring of high-risk pregnancy.</p> <p><b>Telecoaching</b> to stop smoking.</p>	<p><b>Telecoaching</b> for obesity, parental skills and exercise.</p> <p><b>Apps</b> to help with management of LTCs.</p> <p><b>Telecare</b> supporting parents of disabled children.</p>	<p><b>Apps</b> for advice on diet and nutrition.</p> <p><b>Telecoaching</b> for early smoking/ drinking/sex.</p> <p><b>Text</b> reminders.</p> <p><b>Teleconsultation</b> supporting Child and Mental health Services (CAMHS).</p>	<p><b>Teleconsultation</b> to facilitate access to services.</p> <p><b>Mobile telehealth</b> for LTCs.</p> <p><b>Telecare</b> supporting independence of adults with physical and learning disabilities.</p> <p><b>Teleconsultation</b> for convenient access to mental health specialists.</p>	<p><b>Telehealth</b> to manage LTCs such as COPD, CHF and other early onset chronic conditions and support carers' health.</p> <p><b>TECS</b> for screening.</p> <p><b>Apps</b> and telecare providing advice, support and reassurance to carers.</p> <p><b>Teleconsultation</b> to support familial and carer contact.</p>	<p><b>Telehealth</b> to support management of multiple LTCs and rehabilitation.</p> <p><b>Telecare</b> to maintain independence and provide carer support.</p> <p><b>Teleconsultation</b> to facilitate contact with friends and family to reduce loneliness.</p>

## HOW CAN TECS SUPPORT INTEGRATED HEALTH AND SOCIAL CARE?

Closer integration between health and social care can help deliver better-coordinated, patient-centred care across different settings.

The NHS and Adult Social Care Outcomes Frameworks set out a number of common goals, so it is important for health and social care commissioners to work in partnership to achieve them. The use of assistive technology is already standard for local authorities, but it is not utilised as effectively as it could be.

In social care, community alarms and telecare are commonplace but not necessarily integrated with health services. For TECS to be most effective, it requires an integrated approach. The benefits of TECS investment by any one organisation can benefit partner agencies, impact across health and care pathways and support service redesign.

TECS and the Better Care Fund provide opportunities to develop integrated services and care pathways which harness technology to make best use of existing resources and redesign traditional services to meet growing demand.

Technology can enable better continuity and coordination of care and improve the quality of life of people with multiple long term conditions who are at risk of institutional care. Joint care planning and sharing information across multi-disciplinary teams is a key part of this. Involving the range of stakeholders across health and social care from the outset of the commissioning process will help achieve buy-in from staff, partner organisations and patients and carers. Many third sector organisations also have keen interest in the effective use of TECS.

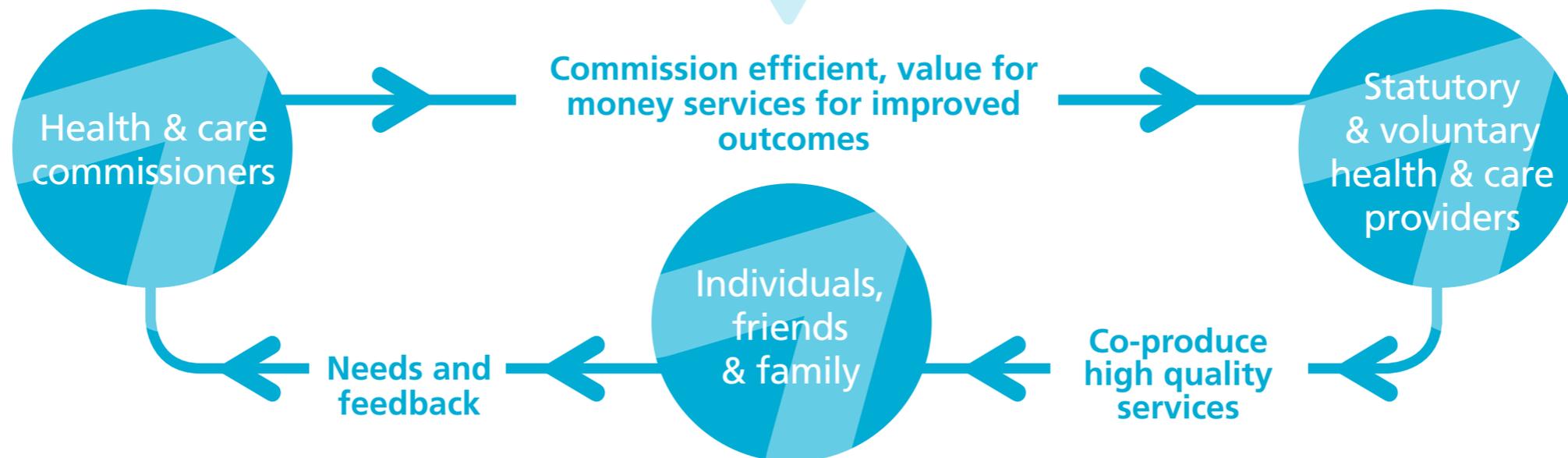
### Commissioners should consider these questions:

- > Who else has a shared interest in the achievement of health and social care outcomes?
- > What is already being used within the local health economy?
- > Which populations and settings may benefit from the use of TECS?
- > What funding is available?

Click [here](#) to see the Skills for Care principles of commissioning assisted living technologies.

## WHO SHOULD BE ENGAGED TO IMPLEMENT TECS?

Engagement with health and care organisations, delivery partners and patients in a local health economy is important to co-produce a mutually effective strategy for TECS.



## HOW DO TECS SUPPORT COMMISSIONER PRIORITIES?

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**Different types of TECS can support a range of priorities within specific healthcare commissioner portfolios. The following examples are health focused to highlight the benefits of TECS to health commissioners and to help local authority commissioners and local technology partners understand how TECS will support CCG outcomes and commissioning intentions. Select your area of interest to find out how.**



## HOW DO TECS SUPPORT COMMISSIONER PRIORITIES?

### Primary care

- Self-monitoring kiosks in practices for routine assessments.
- Telehealth to assist with self-care and enable triaged access to primary care.
- Telehealth for those with complex LTCs and regular unplanned care events.
- Teleconsultation for those who are hard to reach.
- Telemedicine with specialists to prevent unnecessary outpatient attendance.
- Routine secure text/email communication to avoid unnecessary practice visits.
- Apps for early identification and support of healthy behaviour change.
- Promotion of telecare for carer support, medication management, falls and dementia.
- Apps to improve knowledge of health conditions and treatment options.



Primary  
care

Links to further information coming soon.

## HOW DO TECS SUPPORT COMMISSIONER PRIORITIES?

### Community care

- Mobile access to TECS data.
- Telecare with Community Responder to support people with dementia or at risk of falls.
- Remote audio and video conferencing with care team and patient when appropriate.
- Apps to support people to self-care, make best use of community resources and capture ongoing health data
- Telehealth for pre-operative assessment.
- Telecoaching to maintain helpful behaviours.
- Medication management technology to encourage correct use of medication.
- End of life care e.g. TECS palliative care systems.
- Telecare to support and reassure carers.



Community  
care

Links to further information coming soon.

## HOW DO TECS SUPPORT COMMISSIONER PRIORITIES?

### Reablement

- Telecare and telehealth to support rehabilitation e.g. stroke.
- Telehealth for post-operative recovery assessment.
- Digital imaging to inform rehabilitation tailored to home environments.
- Wounds management digital imaging.
- Internet-based therapeutic interventions.
- More effective use of ICES.
- Telecare to support and reassure carers.



Reablement

Links to further information coming soon.

## HOW DO TECS SUPPORT COMMISSIONER PRIORITIES?

### Acute elective

- Text and email appointment reminders.
- Web portals for pre-operative patient health checks and FAQs.
- Telehealth for detailed pre-operative assessment.
- Telecoaching to maintain pre-operative behaviours e.g. smoking/drinking cessation, meds adherence and exercise adherence.
- Telecare to support earlier discharge.
- Telehealth for operative assessment.



Acute  
elective

Links to further information coming soon.

## HOW DO TECS SUPPORT COMMISSIONER PRIORITIES?

### Urgent and emergency care

- 111 could link to patient records/care plans, telehealth and telecare data.
- Telecare service to triage alarm calls to the most appropriate responders, which can reduce emergency service activity.
- Secure messaging from patients to specialists post-discharge (especially for tertiary and quaternary care).
- Telehealth for post-operative assessment.
- Teleconsultation between community, ambulance service and acute care.
- Short-term telehealth monitoring by ambulance service of patients not transported to hospital.
- Telecoaching to maintain post-discharge behaviours e.g. smoking/drinking cessation, medication adherence, exercise adherence.
- Telecare for assessment and design of optimum care packages.
- Telehealth for operative assessment.



Urgent &  
emergency  
care

Links to further information coming soon.

## HOW DO TECS SUPPORT COMMISSIONER PRIORITIES?

### Long term conditions (LTCs)<sup>1</sup>

- Self-care apps to promote understanding of condition and better self-management.
- Health and care focused social networking for people with similar conditions.
- Carer support apps and web portals to reduce carer burden.
- Telehealth for LTCs (initial diagnosis, titration of medication for newly diagnosed/unstable patients, annual reviews for stable patients).
- Telecare to help people remain independent in their own homes.
- Teleconsultation between primary and acute settings.
- Secure messaging for selected patients to their care team.
- Telecare for at-risk groups e.g. falls monitors, pendant alarms, environmental controls/alarms.

<sup>1</sup> The **Long Term Conditions Dashboard** provides population level indicators related to LTCs which can help commissioners to consider what their overall need is for LTCs, what the quality of the service they provide is and what impact this has on the overall health and social care economy.

Long term  
conditions  
(LTCs)

Links to further information coming soon.

## HOW DO TECS SUPPORT COMMISSIONER PRIORITIES?

### Maternity and children

- Telecoaching for smoking cessation, weight control and eating disorders.
- Telehealth for higher-risk pregnancy.
- Telehealth for control of hypertension or gestational diabetes.
- Telehealth for natural miscarriage support.
- Telehealth for gynaecology post-operative discharge advice.
- Teleconsultation for ease of access to community and primary care services for new mothers.
- Text reminders, apps and video coaching for children with asthma to promote use of inhalers.
- Teleconsultation in child and adolescent mental health services.



Maternity  
& children

Links to further information coming soon.

## HOW DO TECS SUPPORT COMMISSIONER PRIORITIES?

### Mental health

- Mental health recovery services for care plan/wellbeing and medication reminders.
- Devices and apps to stimulate memory and enable safe walking for those with dementia.
- Telecare for conditions associated with learning difficulties e.g. epilepsy sensors to inform home-based assessment and long term management, video care plans for epilepsy.
- Activities for daily living reminders for people with autism and Asperger's syndrome.
- Interactive appointment reminders for ADHD clinic.
- Telehealth for alcohol and substance misuse recovery support.
- Teleconsultation or telecare ambient monitoring for assessing lifestyle behaviour and mood.
- Telecare to support risk assessment and mitigation within hospital, care homes and communities.
- Teleconsultation for in-patient units and mental health tribunals.

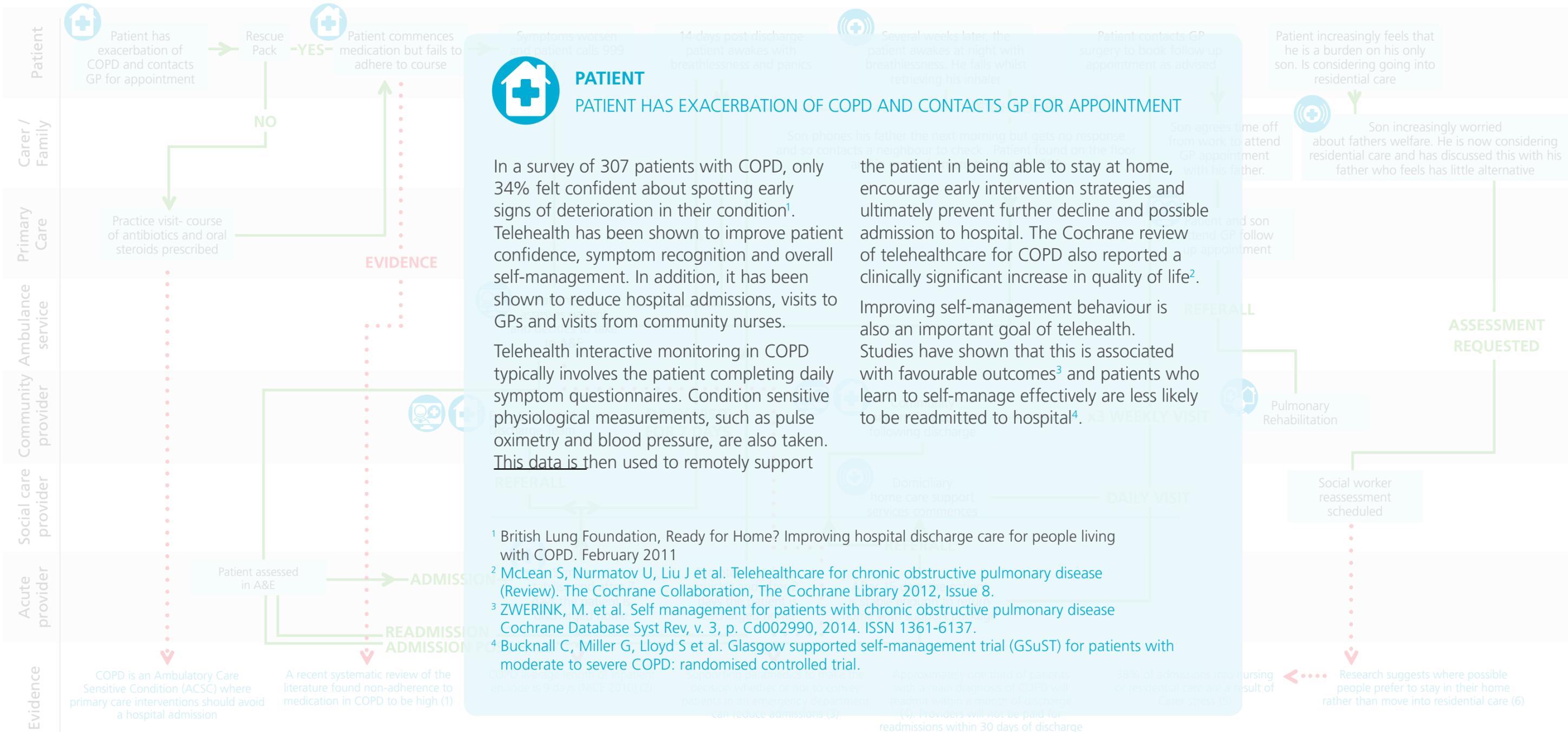


Mental  
health

Links to further information coming soon.



COPD EXACERBATION EVENT Example Patient Journey with TECS support ideas



**PATIENT**  
**PATIENT HAS EXACERBATION OF COPD AND CONTACTS GP FOR APPOINTMENT**

In a survey of 307 patients with COPD, only 34% felt confident about spotting early signs of deterioration in their condition<sup>1</sup>. Telehealth has been shown to improve patient confidence, symptom recognition and overall self-management. In addition, it has been shown to reduce hospital admissions, visits to GPs and visits from community nurses. Telehealth interactive monitoring in COPD typically involves the patient completing daily symptom questionnaires. Condition sensitive physiological measurements, such as pulse oximetry and blood pressure, are also taken. This data is then used to remotely support

the patient in being able to stay at home, encourage early intervention strategies and ultimately prevent further decline and possible admission to hospital. The Cochrane review of telehealthcare for COPD also reported a clinically significant increase in quality of life<sup>2</sup>. Improving self-management behaviour is also an important goal of telehealth. Studies have shown that this is associated with favourable outcomes<sup>3</sup> and patients who learn to self-manage effectively are less likely to be readmitted to hospital<sup>4</sup>.

<sup>1</sup> British Lung Foundation, Ready for Home? Improving hospital discharge care for people living with COPD. February 2011

<sup>2</sup> McLean S, Nurmatov U, Liu J et al. Telehealthcare for chronic obstructive pulmonary disease (Review). The Cochrane Collaboration, The Cochrane Library 2012, Issue 8.

<sup>3</sup> ZWERINK, M. et al. Self management for patients with chronic obstructive pulmonary disease Cochrane Database Syst Rev, v. 3, p. Cd002990, 2014. ISSN 1361-6137.

<sup>4</sup> Bucknall C, Miller G, Lloyd S et al. Glasgow supported self-management trial (GSuST) for patients with moderate to severe COPD: randomised controlled trial.

REFERALL

ASSESSMENT REQUESTED

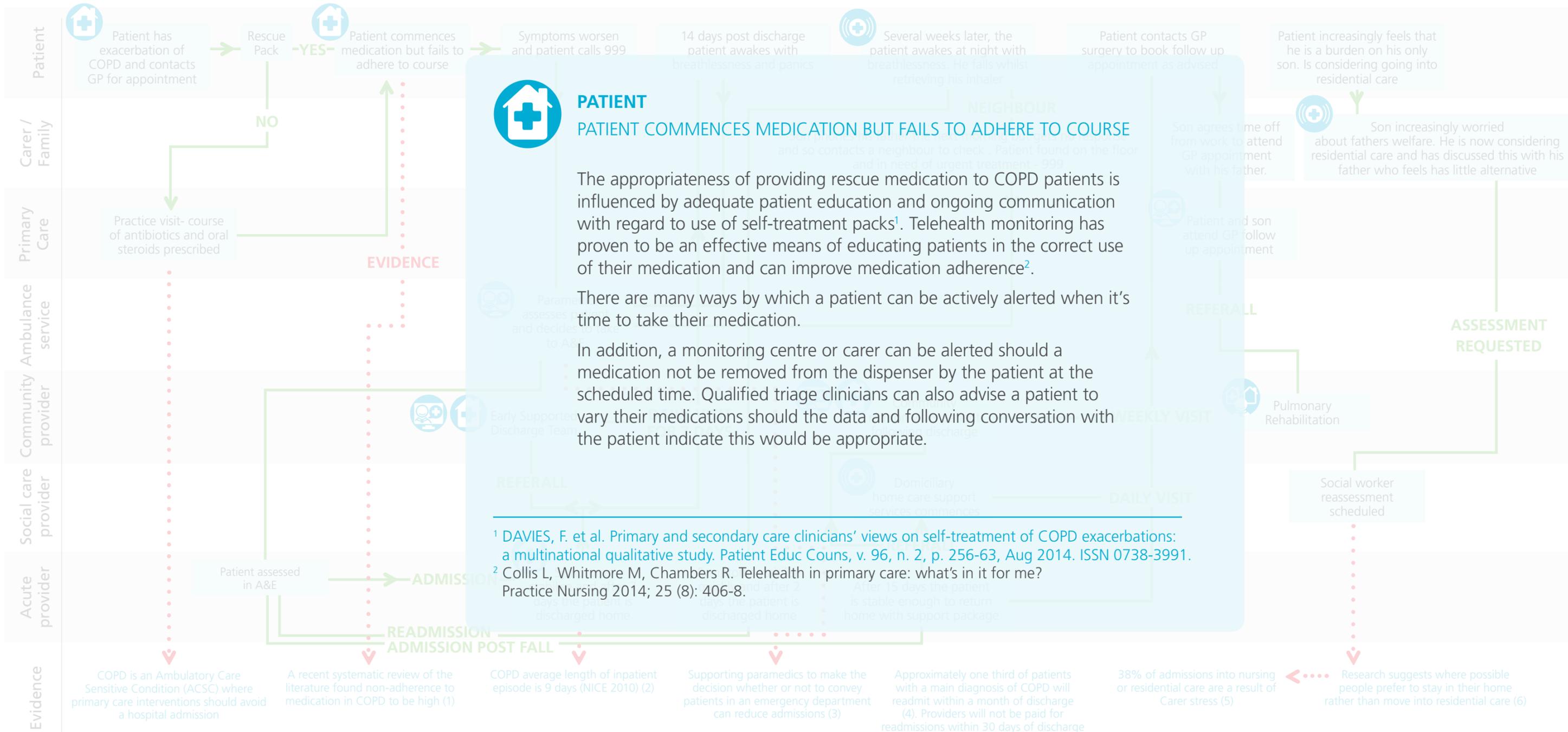
Pulmonary Rehabilitation

Social worker reassessment scheduled

EVIDENCE



### COPD EXACERBATION EVENT Example Patient Journey with TECS support ideas



Key



Telehealth



Teleconsultation



Telecare



Telemedicine



Telerehabilitation



Please click on the icons to see how TECS can improve the patient's journey

COPD EXACERBATION EVENT Example Patient Journey with TECS support ideas



Key



Telehealth



Teleconsultation



Telecare



Telemedicine

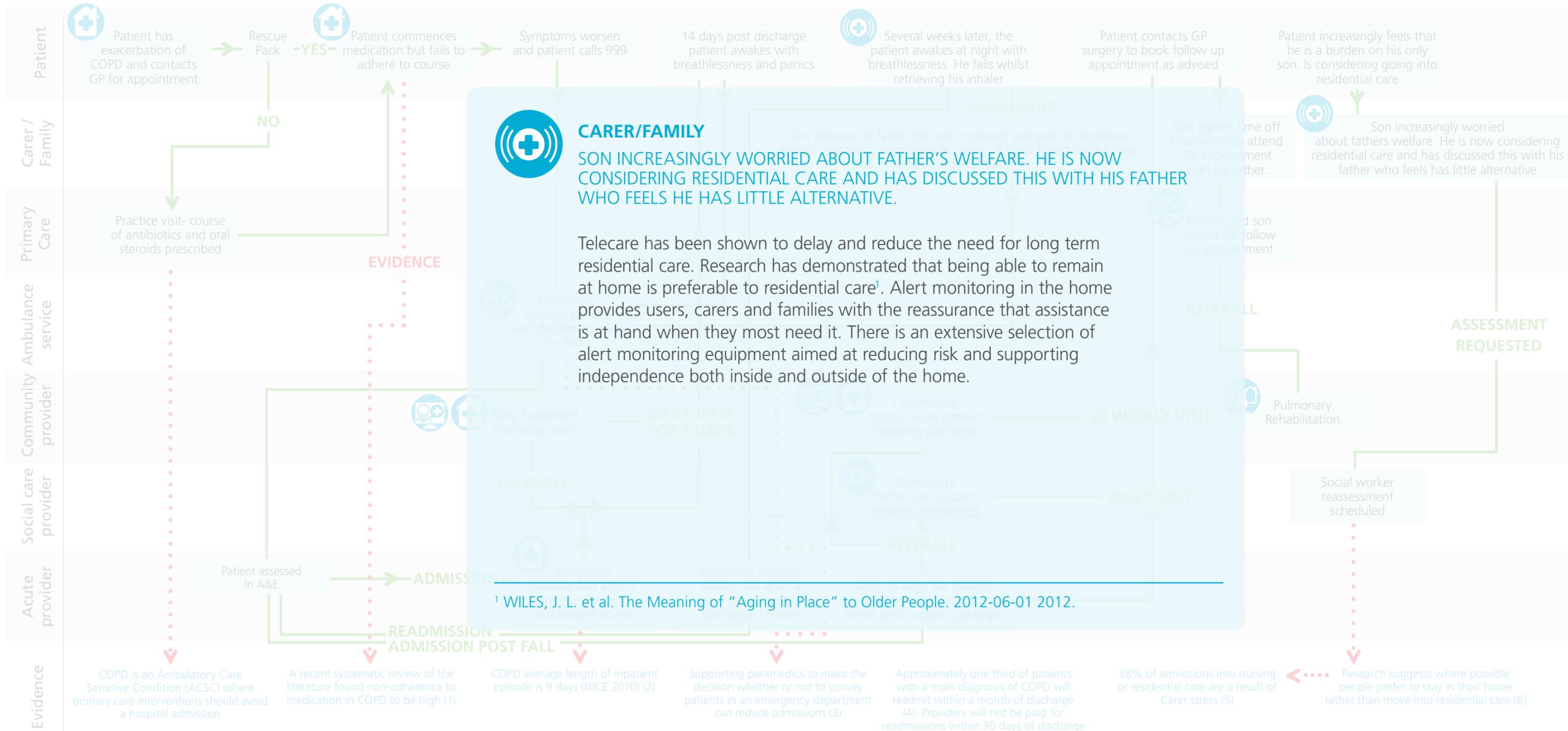


Telerehabilitation



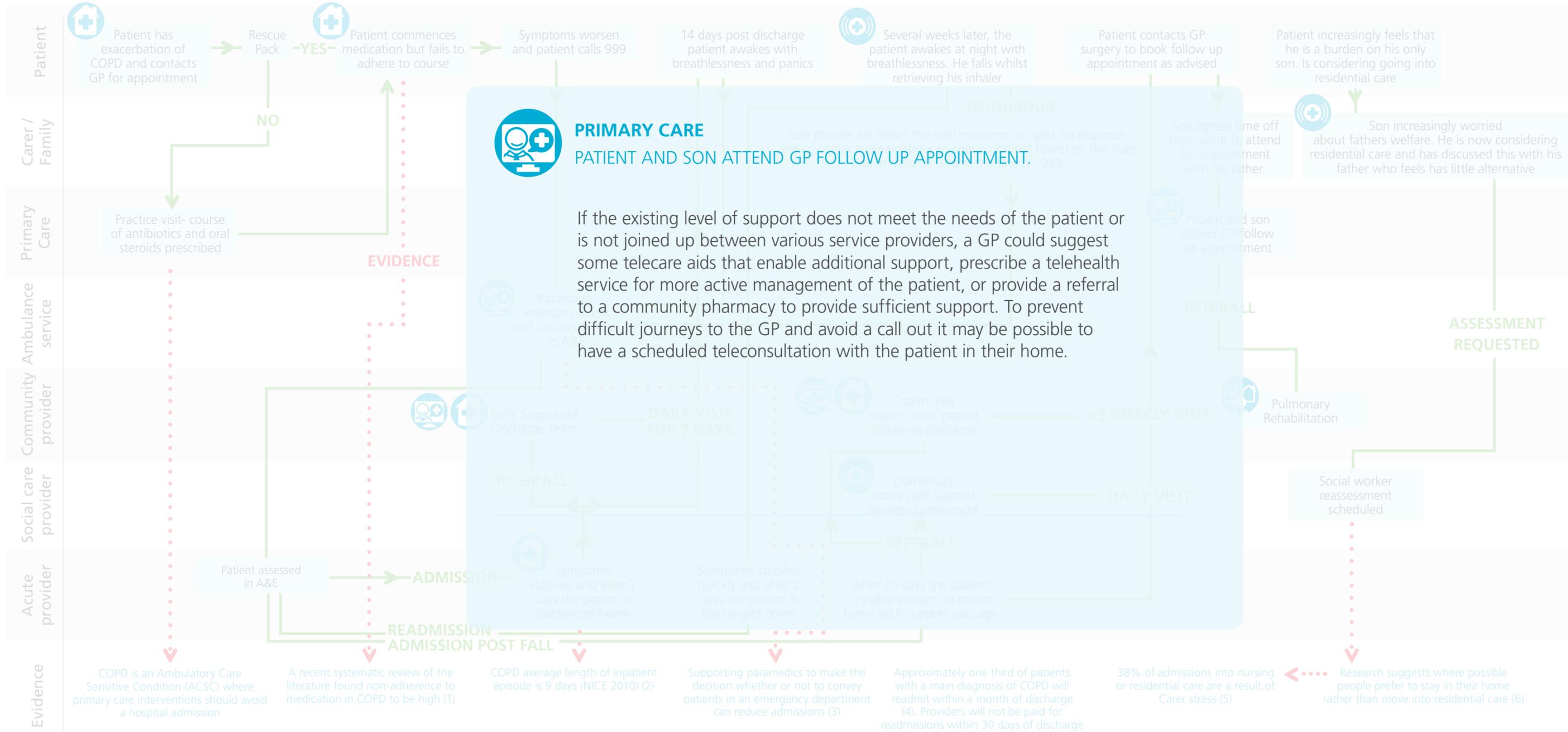
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COPD EXACERBATION EVENT Example Patient Journey with TECS support ideas



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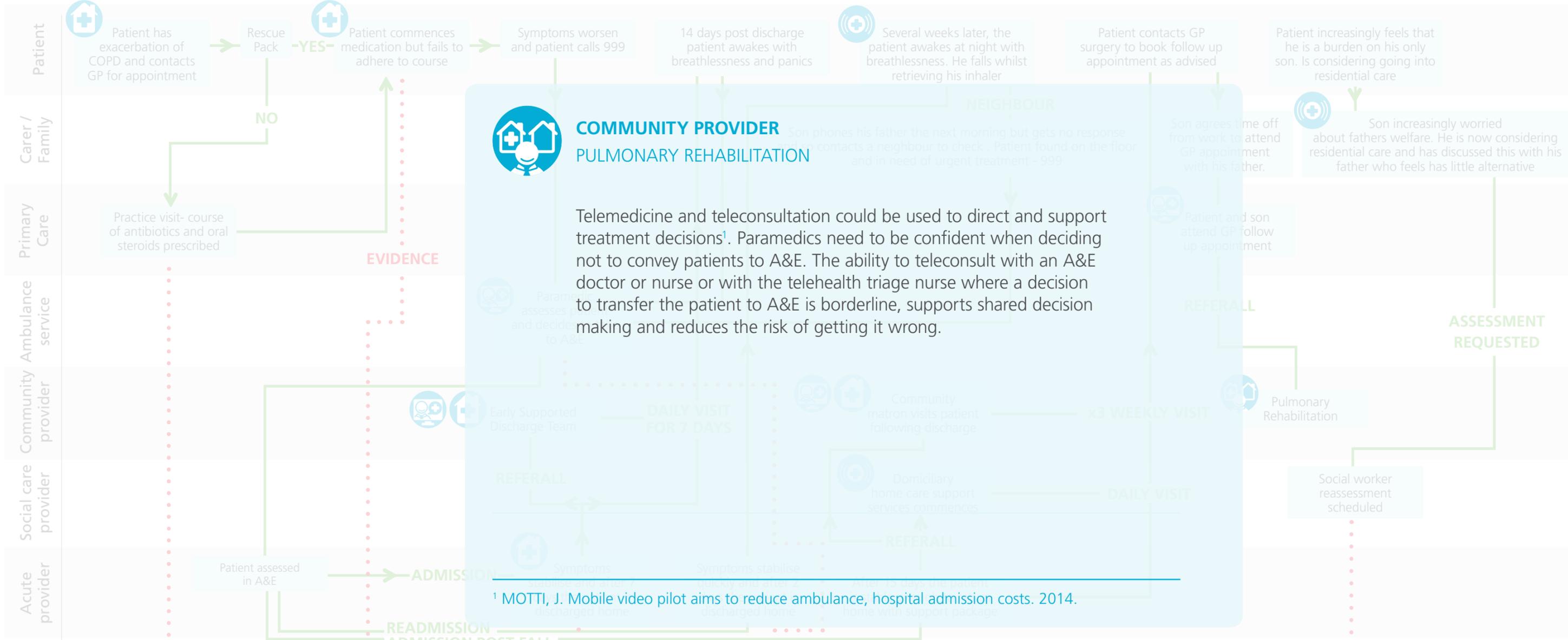
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### COPD EXACERBATION EVENT Example Patient Journey with TECS support ideas



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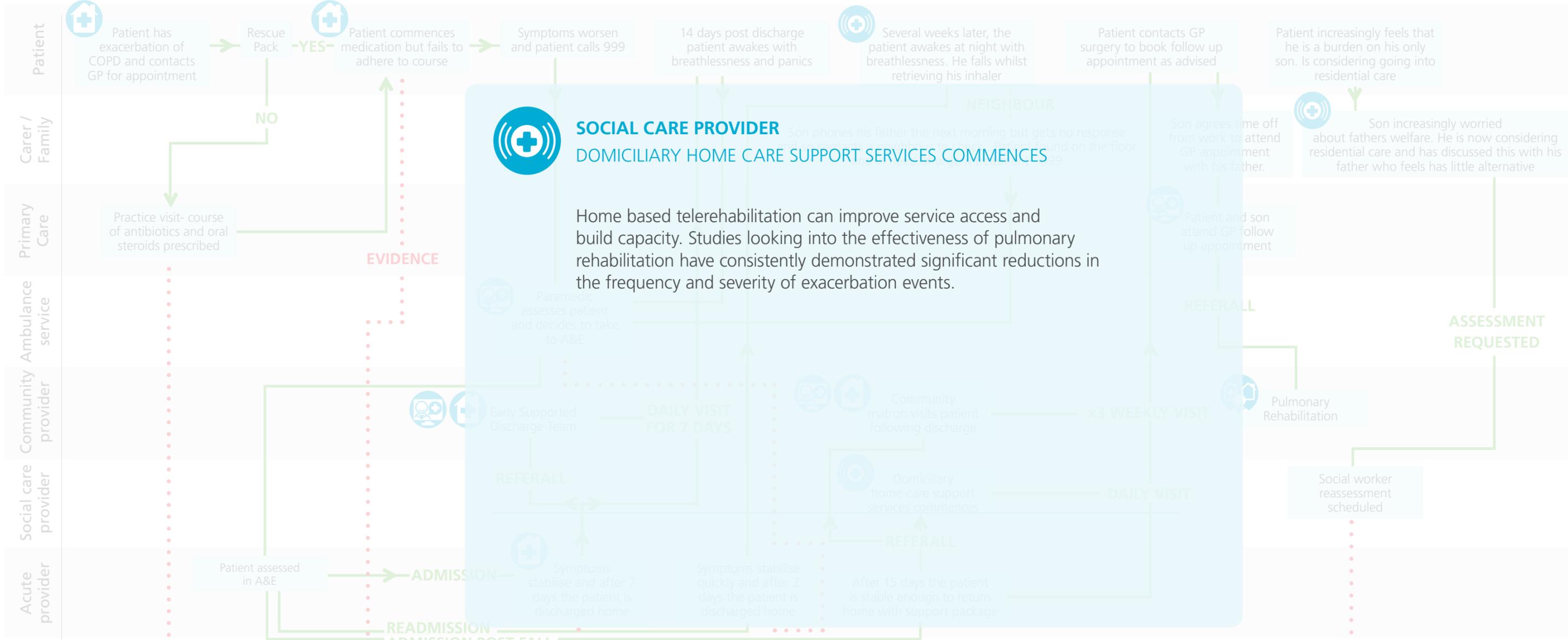
Please click on the icons to see how TECS can improve the patient's journey

<sup>1</sup> MOTTI, J. Mobile video pilot aims to reduce ambulance, hospital admission costs. 2014.

**Evidence**

- COPD is an Ambulatory Care Sensitive Condition (ACSC) where primary care interventions should avoid a hospital admission
- A recent systematic review of the literature found non-adherence to medication in COPD to be high (1)
- COPD average length of inpatient episode is 9 days (NICE 2010) (2)
- Supporting paramedics to make the decision whether or not to convey patients in an emergency department can reduce admissions (3)
- Approximately one third of patients with a main diagnosis of COPD will readmit within a month of discharge (4). Providers will not be paid for readmissions within 30 days of discharge
- 38% of admissions into nursing or residential care are a result of Carer stress (5)
- Research suggests where possible people prefer to stay in their home rather than move into residential care (6)

**COPD EXACERBATION EVENT** Example Patient Journey with TECS support ideas



**SOCIAL CARE PROVIDER**  
 DOMICILIARY HOME CARE SUPPORT SERVICES COMMENCES

Home based telerehabilitation can improve service access and build capacity. Studies looking into the effectiveness of pulmonary rehabilitation have consistently demonstrated significant reductions in the frequency and severity of exacerbation events.

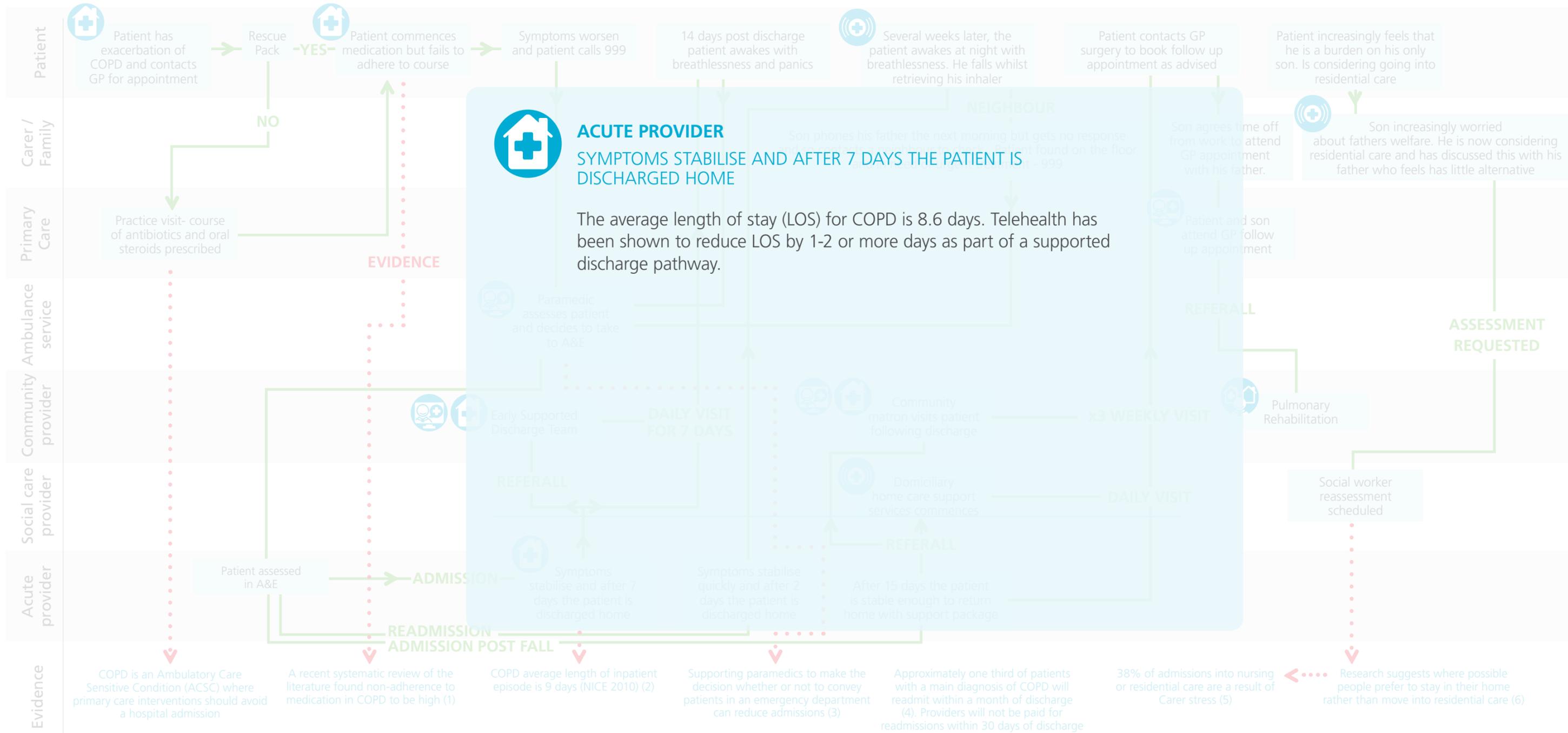
EVIDENCE

ASSESSMENT REQUESTED

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Please click on the icons to see how TECS can improve the patient's journey

COPD EXACERBATION EVENT Example Patient Journey with TECS support ideas



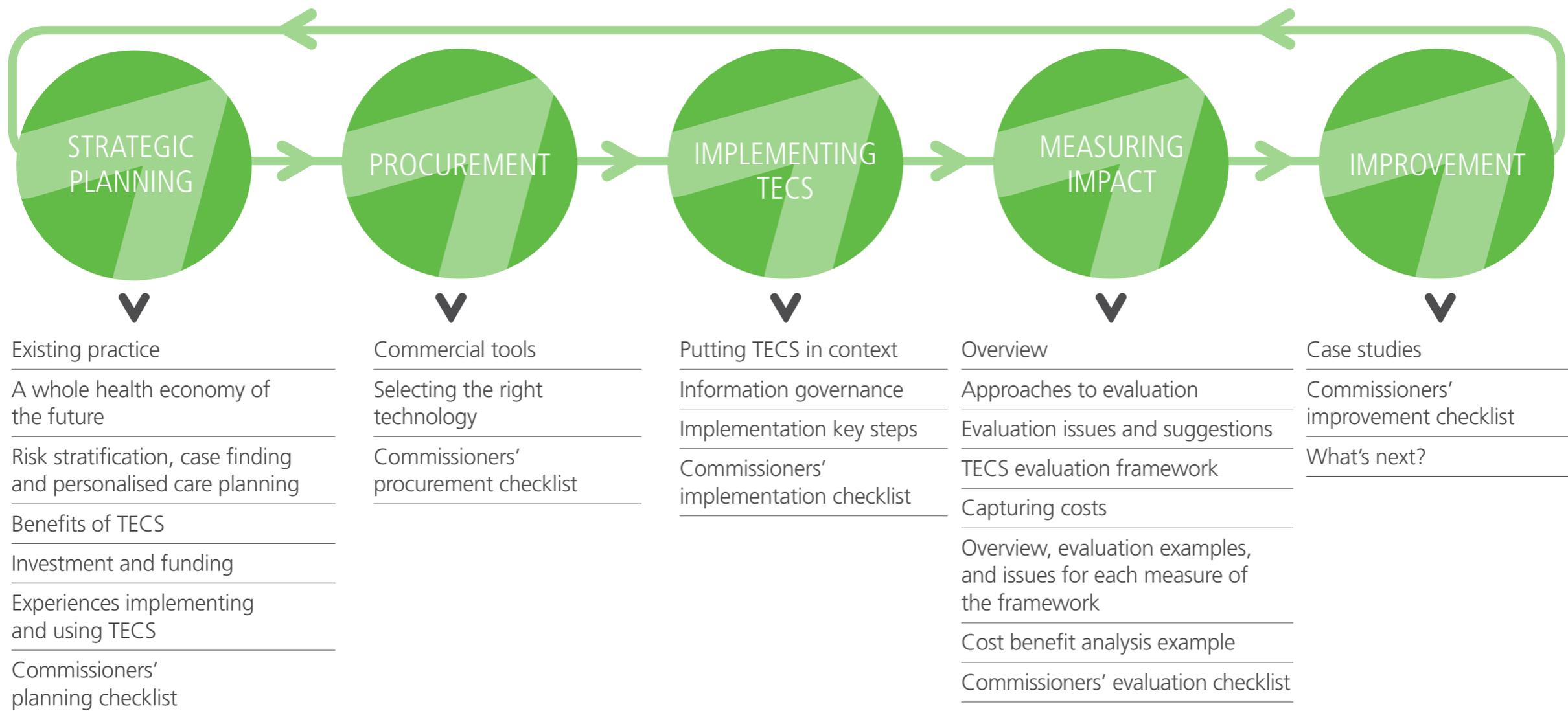
Please click on the icons to see how TECS can improve the patient's journey

# HOW DOES TECS RELATE TO THE COMMISSIONING CYCLE?



## TRANSFORMING HEALTH AND CARE THROUGH THE USE OF TECS

We can build short, medium and long term plans for TECS into the routine commissioning cycle. This section provides links to supporting information that aligns with the commissioning cycle.



## STRATEGIC PLANNING

### Existing practice

You can use the TECS maps to identify what types of TECS are being commissioned and delivered in your local area. This can help you to collaborate and form partnerships across health and social care.

Since telehealth, telecare and teleconsultation services first became available in the UK, the cost of technology and communications infrastructure has reduced and many pilot sites have developed an understanding of what factors are critical to success.

However, it is not uncommon for neighbouring regions and providers to be unaware of the TECS activity of their delivery partners and the learning they could take from their neighbours.

These interactive maps show where CCGs, local authorities and NHS trusts are using **telecare** and **telehealth** and provide links to further information. You can also add information about your local TECS activities by accessing these maps.



## STRATEGIC PLANNING

How can TECS support a whole health economy of the future?

Click each circle  
to find out more



Click each circle  
to find out more

## STRATEGIC PLANNING

### How can TECS support a whole health economy of the future?



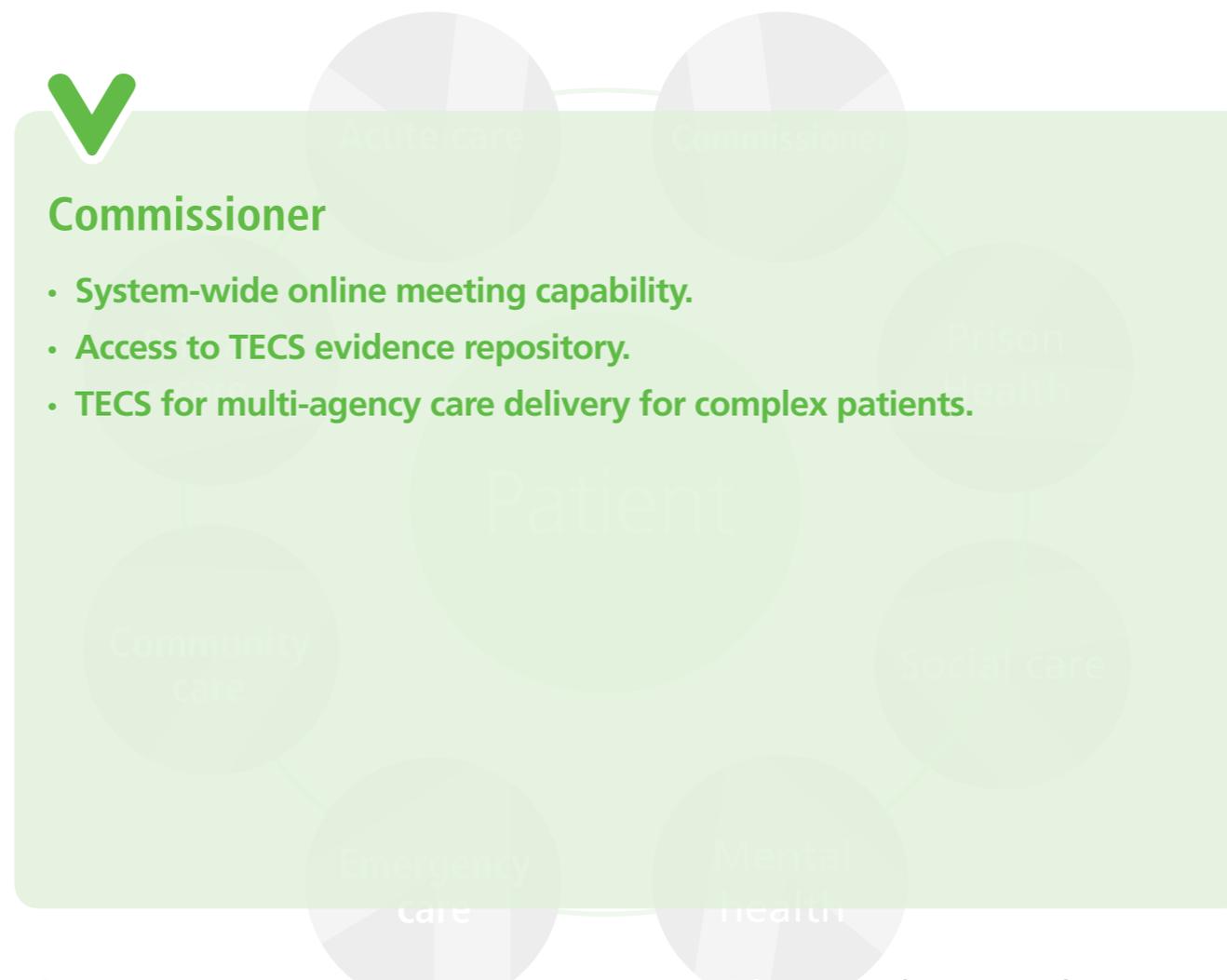
#### Patient

- **TECS for self-care and empowerment.**
- TECS link to integrated digital care record.
- Telemonitoring, telecoaching and telecare as necessary.
- **Access to prescribed apps and websites.**
- **Remote face-to-face interaction with care team.**
- **Remote monitoring of certain patients' self-monitoring.**
- **Telecare supporting care closer to home and informal carers.**

Click on the links to access case studies, evidence or further information.

## STRATEGIC PLANNING

How can TECS support a whole health economy of the future?



Click on the links to access case studies, evidence or further information.

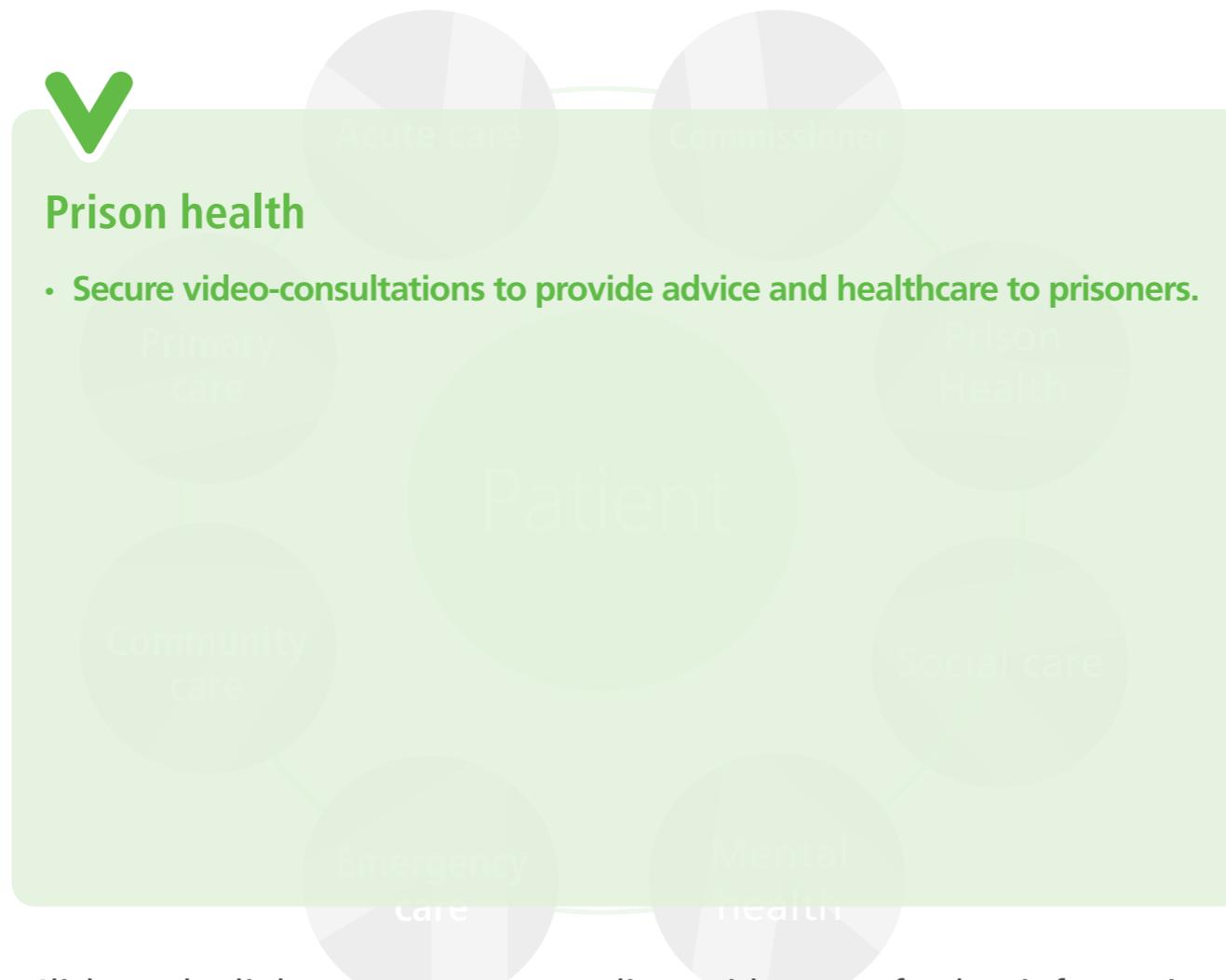
## STRATEGIC PLANNING

### How can TECS support a whole health economy of the future?



#### Prison health

- **Secure video-consultations to provide advice and healthcare to prisoners.**



Click on the links to access case studies, evidence or further information.

## STRATEGIC PLANNING

### How can TECS support a whole health economy of the future?



#### Social care

- TECS for social care delivery as part of enablement.
- Self-care and growth of self-funded services.
- Development of TECS market place promoted through Care Act responsibilities.
- TECS supporting delayed admission to long term care.
- Safeguarding.
- Informal carers.
- New housing models.
- Remote monitoring of learning difficulties and **dementia**.
- Parent skills coaching.
- Reducing isolation.

Click on the links to access case studies, evidence or further information.

## STRATEGIC PLANNING

### How can TECS support a whole health economy of the future?



#### Mental health

- Teleconsultation between care home, sheltered accommodation and primary care.
- **Dementia memory aids.**
- Telehealth to record information on wellbeing and videoconferencing between patient/therapist to support management of depression.
- **Remote online therapy for emotional or psychological distress.**
- **Telecare for epilepsy.**
- **Telecare for safe walking.**

Click on the links to access case studies, evidence or further information.

## STRATEGIC PLANNING

### How can TECS support a whole health economy of the future?



#### Emergency care

- Access to telehealth data for emergency care practitioners.
- Electronic transfer of data from ambulance and paramedic cars into A&E and notification of event to GP.
- Telemonitoring discharge packs and secure messaging.

Click on the links to access case studies, evidence or further information.

## STRATEGIC PLANNING

### How can TECS support a whole health economy of the future?



#### Community care

- Access to patients' telecare data.
- Smart wound dressings, smart catheters.
- Meds adherence and management technology.
- Motivational coaching, support apps and carer online services.
- Remote face-to-face interaction with care team.
- Remote monitoring of certain patients' self-monitoring.
- Telecare supporting care closer to home and informal carers.

Click on the links to access case studies, evidence or further information.

## STRATEGIC PLANNING

### How can TECS support a whole health economy of the future?



#### Primary care

- Remote face-to-face interaction with patients.
- Online audio or video meetings.
- Telemedicine links with key specialists from surgery team.
- eConsultation via GP systems with specialists.
- Recommend apps for patients.

Click on the links to access case studies, evidence or further information.

## STRATEGIC PLANNING

### How can TECS support a whole health economy of the future?



#### Acute care

- Pre-op and post-op telehealth.
- Telemedicine clinics with primary care, community staff and patients.
- eConsultations via GP systems.
- Telecare supporting discharge and admissions avoidance.
- Ambulance based telemedicine.

Click on the links to access case studies, evidence or further information.

## STRATEGIC PLANNING

### Risk stratification, case finding and personalised care planning

TECS vary in complexity and cost. Individuals who may benefit from TECS can be identified through risk stratification and case finding. A health or social care professional can match the needs of the individual with the most appropriate and beneficial interventions conducting an assessment. Increasingly, people will be using some level of TECS in everyday life.



#### RISK STRATIFICATION<sup>1</sup> AND CASE FINDING

Need to ensure workforce understands and promotes TECS. Identify which patients need anticipatory interventions to prevent predicted exacerbations.

Commissioners should already have access to risk stratification tools that identify people with complex needs. In many cases, CSUs already provide risk stratification services for CCGs.

<sup>1</sup> Further information on risk stratification can be found [here](#).



#### TECS APTITUDE ASSESSMENT

Determine the patient's beliefs and aptitude to benefit from TECS and their state of readiness to adopt the necessary level of support. Link to local support groups if required.



#### TECS SERVICE ASSESSMENT

Understand the patient's motivation and preferred type of technology. What do they already use?

Share decision-making with the patient to determine which TECS can provide the most benefit to the individual. Review appropriateness regularly.

#### PERSONALISED CARE PLAN

It is important to take into consideration issues around confidentiality and legal consent when sharing population level data as well as when sharing information for direct care. The Health and Social Care Information Centre's [Guide to Confidentiality in Health and Social Care](#) sets out five clear rules for information sharing as part of a person's direct care.

## STRATEGIC PLANNING

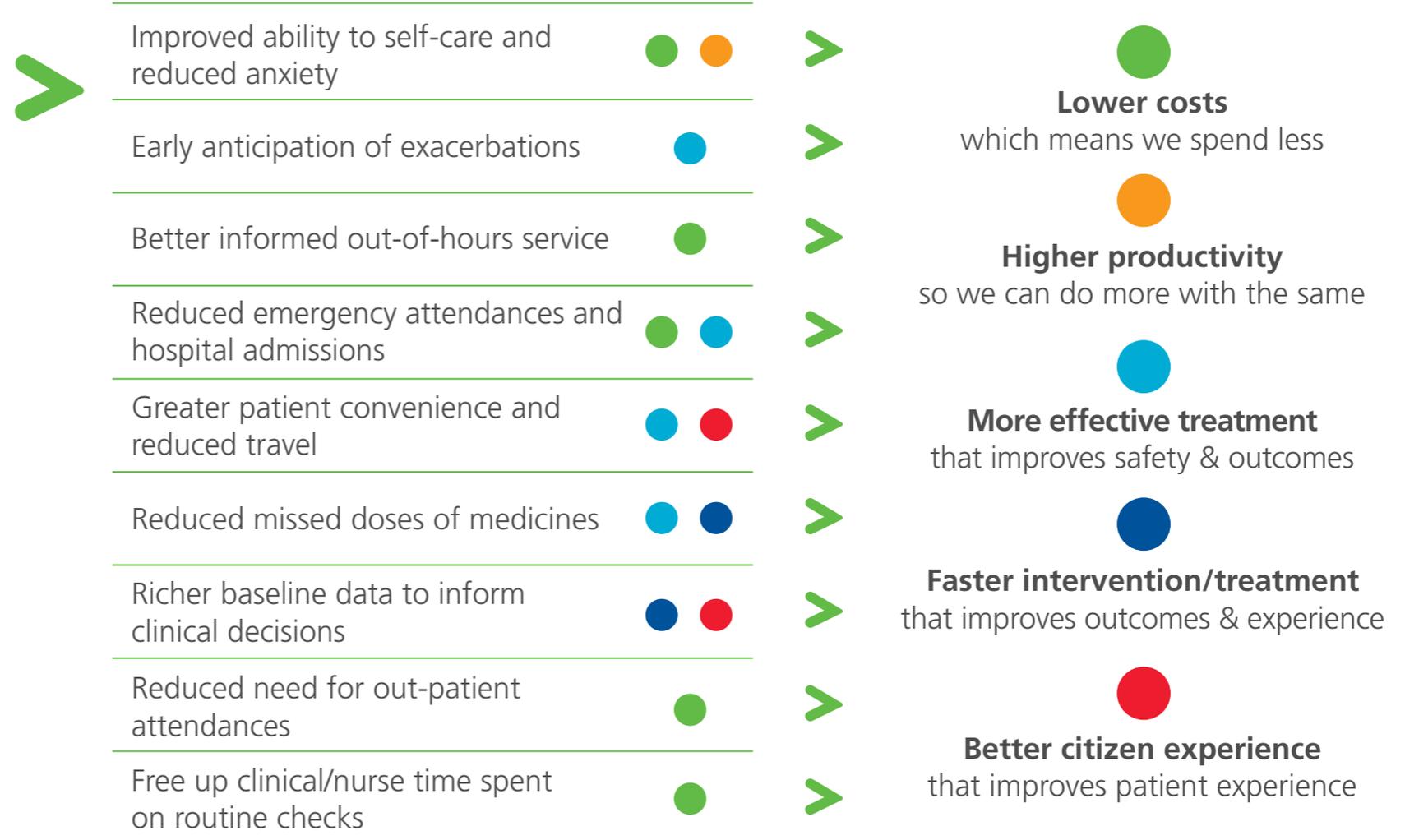
### Benefits

The diagram below shows the outcomes and benefits linked to different TECS solutions.  
Use it to help develop your business case for TECS.

#### SOLUTIONS

#### OUTCOMES

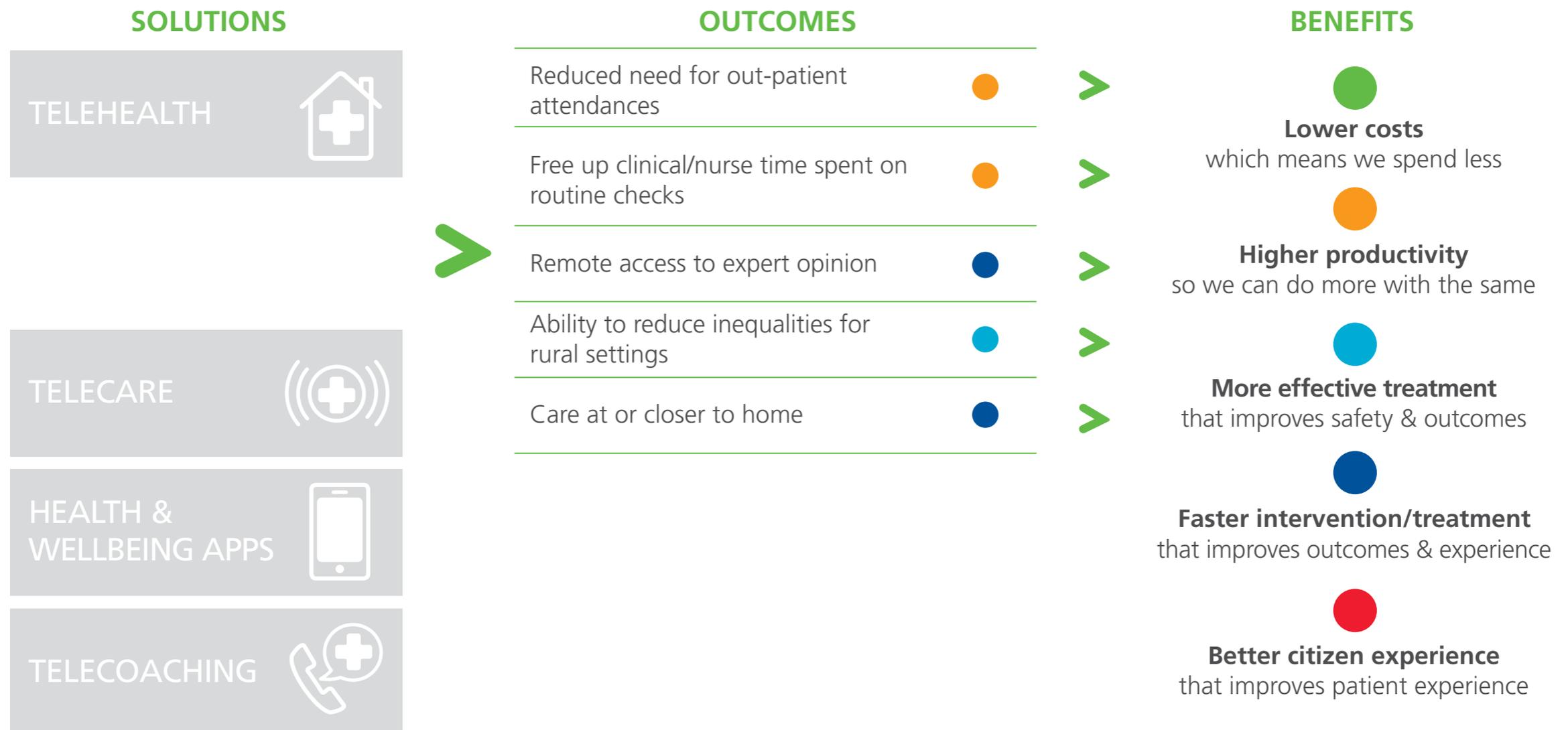
#### BENEFITS



## STRATEGIC PLANNING

### Benefits

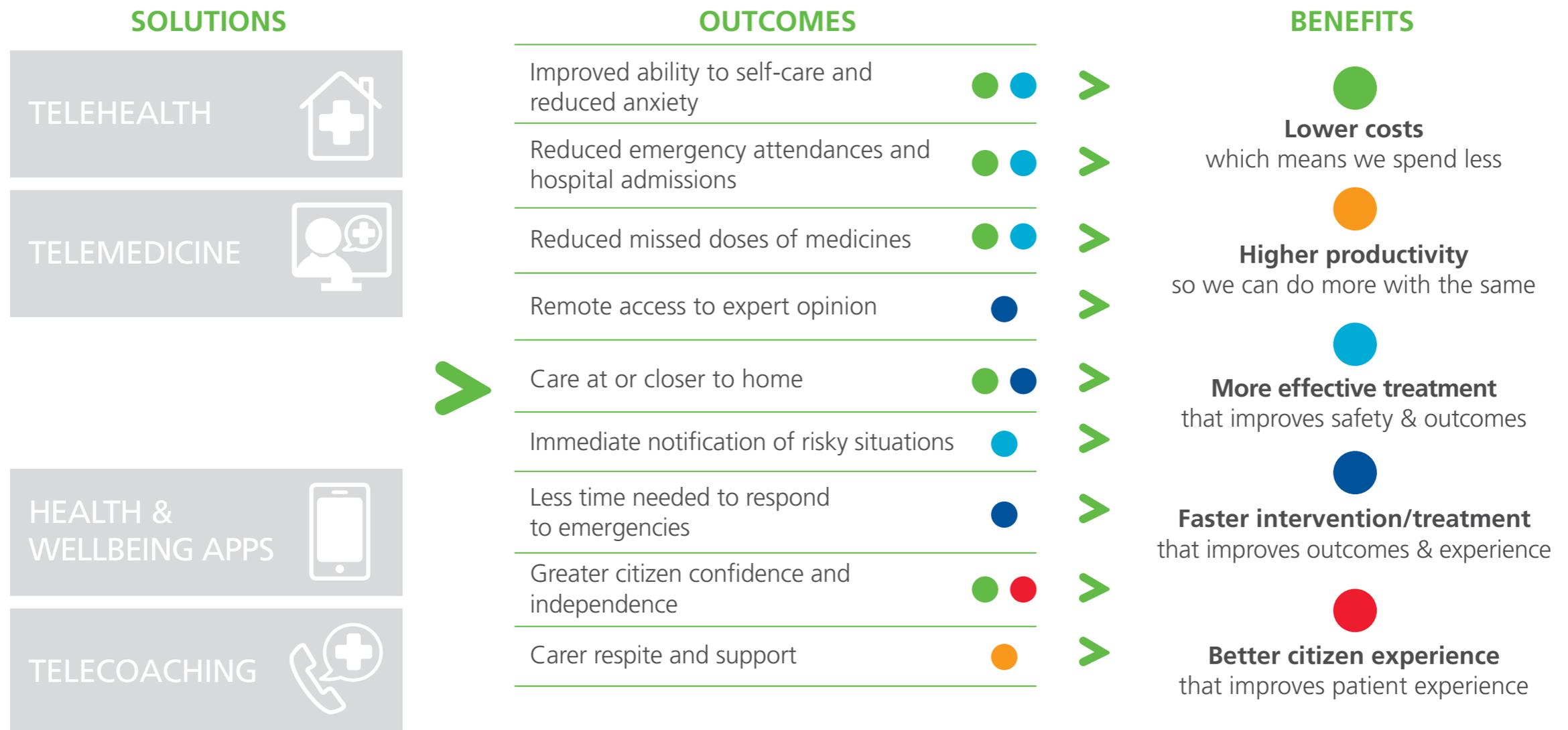
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## STRATEGIC PLANNING

### Benefits

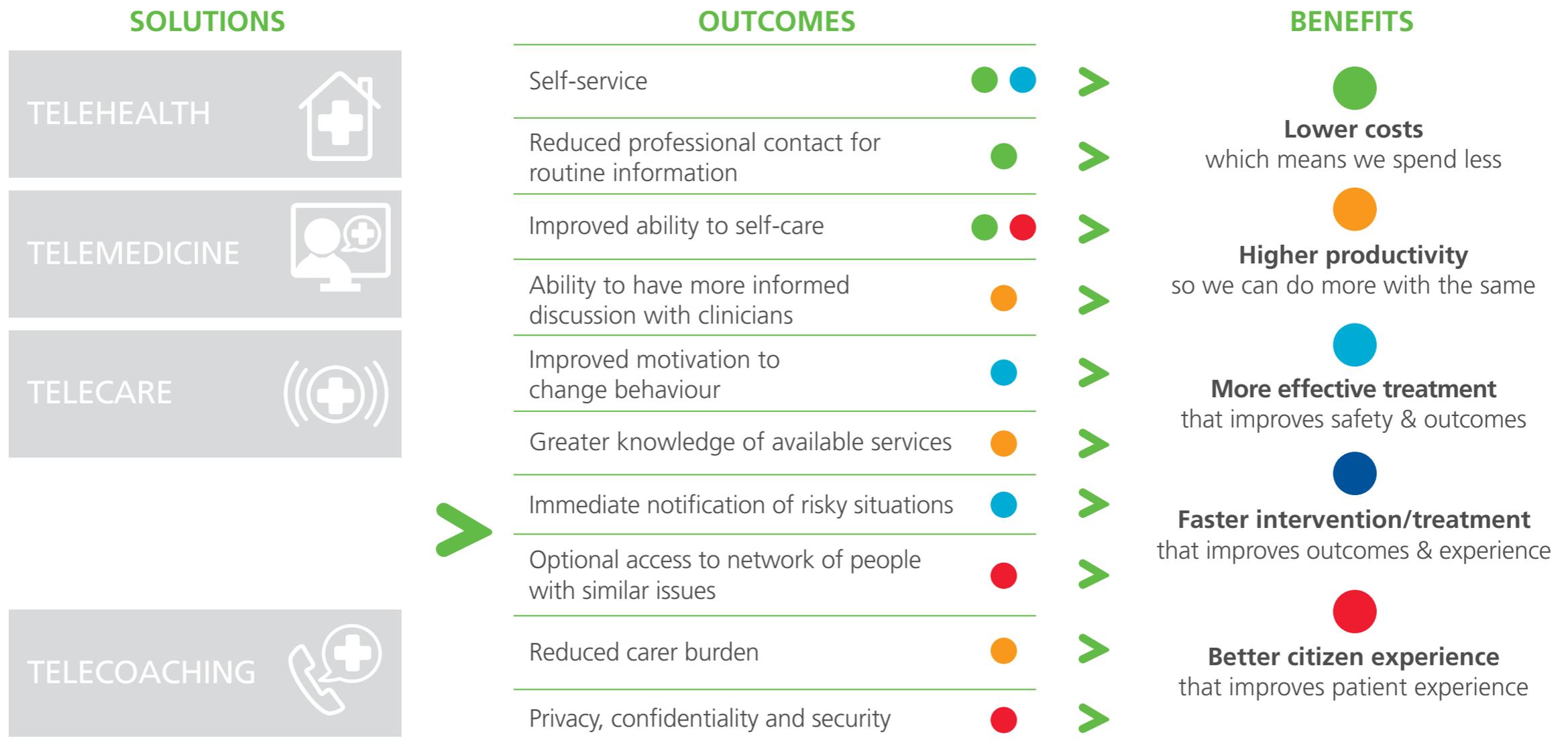
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## STRATEGIC PLANNING

### Benefits

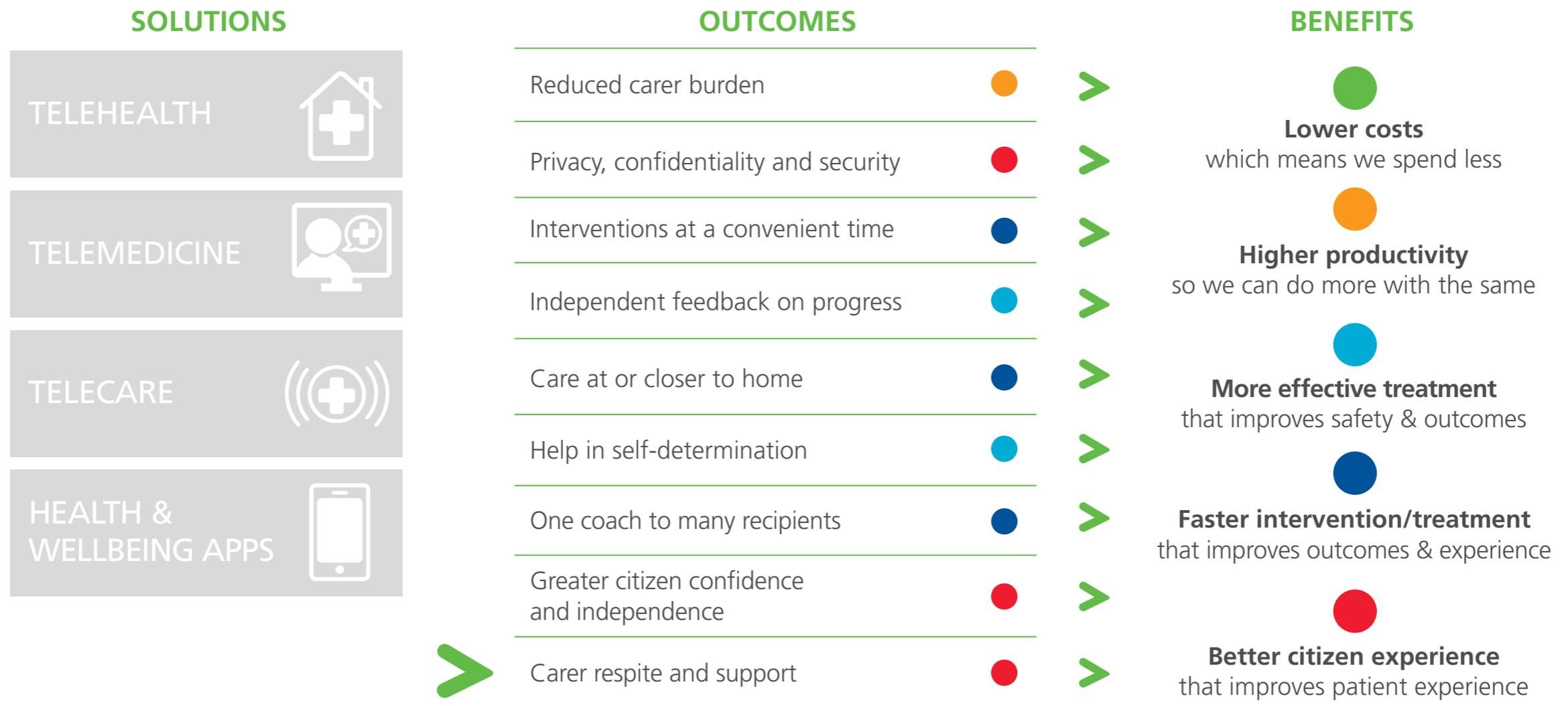
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Use it to help develop your business case for TECS.



## STRATEGIC PLANNING

### Benefits

The diagram below shows the outcomes and benefits linked to different TECS solutions. Use it to help develop your business case for TECS.



## STRATEGIC PLANNING

### Investment and funding

Commissioners should model the financial impact on different organisations in their locality to provide inputs for a robust business case. Some stakeholders have highlighted that financial levers could be adjusted to enable and encourage the wider uptake of TECS solutions. NHS England intends to explore the ways in which tariff could support better delivery of TECS and encourage prevention.

#### Questions to consider when building your financial case:

- What is the current investment in TECS? Who benefits?
- What are the demographic concerns and the scale and nature of likely demand for different services in your locality?
- What are the current costs of primary, secondary, community and social care? Where are the opportunities to reduce these costs through the use of TECS?'
- What are the existing financial flows between the organisations that provide services in your area?
- How would the financial flows change if TECS was implemented and who would see the financial benefits?
- What are the financial costs to patients and carers of the way in which services are currently organised in terms of travel time and cost or lost work hours?
- What is the wider societal impact, for example on patient and carer employment, and how can TECS modify these?

#### There are a number of potential sources of investment and funding for TECS initiatives:

- Better Care Fund
- Prime Minister's Challenge Fund: Improving Access to General Practice
- Future Regional Innovation Funds
- InnovateUK (Technology Strategy Board) Funding
- Self-funded care

## STRATEGIC PLANNING

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### **Examples of people's experiences of implementing and using TECS**

Commissioners who have invested in TECS, and patients and clinicians who have used TECS share their experiences.

## STRATEGIC PLANNING

### Commissioners' planning checklist

This checklist can help you ensure that the right questions have been addressed when planning for TECS.

- Do we have a forum to discuss this e.g. a TECS Board?
- Do we know what the current provision of TECS is?
- Do we have clarity around the improvements we want to achieve within the local/regional health and social care economy?
- Do we have an agreed vision for the service?
- Do key stakeholders agree with a single definition of success, and have those who may be unconvinced been identified?
- Do we understand what TECS can offer?
- Do we have clarity around the benefits the new service will deliver to patients, carers and the health and social care system?

- Have we considered how care pathways could be redesigned to improve coordination, quality or efficiency?
- Have we set out how TECS will be integrated into the end-to-end service?
- Have clinicians and local clinical leaders been consulted and involved throughout the process?
- Do we have clinical and managerial leadership?
- Who are the delivery partners in the care pathway and what arrangements and flexibilities are there?
- Are there opportunities for mutual benefit/cost sharing between organisations?

- Have roles and responsibilities been defined across all health and social care partners?
- Have we included providers in planning where change is affecting work place practices?
- Have we conducted a readiness assessment? Are all organisations ready for the change?
- Have relevant standards been taken into account when commissioning? (e.g. TSA, BSI, EU standards, ISO2002)
- Have we built in regular reviews of both the service and the implementation?
- Have information governance requirements been taken into account?

## PROCUREMENT

### Commercial tools

Work on the TECS programme is relevant to a number of other transformational programmes also focussed on enabling greater digital engagement.

Closer collaboration and information sharing are key to improving the quality and consistency of procurement of TECS. The Integrated Digital Care Fund (IDCF) Commercial Toolkit has been developed to support the Integrated Digital Care Record (IDCR) strategy. It can support health and social care professionals planning to procure TECS by providing a service that:

- collates existing best practice commercial and procurement guidance and reference material;
- makes useful information and documentation accessible and easy to use;
- improves cross-working and information sharing through 'peer assist' tools and networks;
- identifies gaps where new guidance is required and creates the necessary commercial resources.

### The IDCF Commercial Toolkit includes:

- guidance for NHS organisations for complying with procurement processes;
- a standard contract (and guidance for use);
- open-source solutions;
- ePrescribing requirements; and
- signposting to available buying vehicles relevant to the IDCR.



**Click [here](#) to access the IDCF Toolkit.** It is also available on the interactive ICT Workspace on the Department of Health Centre for Procurement Efficiency portal.

## PROCUREMENT

### Commercial tools

Commissioners need the tools and resources to compare and select the most appropriate TECS for their local population.

#### Information sources to help select TECS:

- [Telecare Services Association, 'Telecare and Telehealth'](#): An introduction to some of the most widely used telecare and telehealth services today.
- [www.mickshouse.info](http://www.mickshouse.info): This website shows telecare sensors and explains their functionality.
- Disabled Living Foundation (DLF), ['Personal alarm systems and telecare factsheet'](#): The factsheet provides first stop information on the type of telecare systems available to help with specific difficulties, and details about the useful features of the technology.
- [www.livingmadeeasy.org.uk](http://www.livingmadeeasy.org.uk): This site can help you identify products for health, independence and wellbeing from some of the UK's leading companies.
- The DLF's ['AskSARA' tool](#) offers guided advice to help find the technologies that will best help an individual.
- ['AT Dementia'](#) highlights technologies that support people with dementia and their carers.
- ['HFT Personalised Technology'](#): Highlights technologies that support people with learning disabilities.
- The HFT's [virtual Smart House](#) shows some of the technologies that a person with a learning disability may use around their home to improve their independence and increase their safety.
- Social Care Institute for Excellence, ['Ethical issues in the use of telecare'](#).
- The King's Fund, ['Information technologies'](#): A view of the emerging app market.
- <http://apps.nhs.uk>: This website provides NHS-approved apps.
- <http://everyday-life.co.uk>: A decision support aid designed to help patients and healthcare professionals to find the right technology solutions based on need.
- Royal College of Nursing, ['Telehealth and telecare'](#): Definitions, potential benefits and impact, and developments across the UK.
- Coventry University, ['Innovation in supporting people at risk of falling'](#): resources for health and social care professionals and potential fall detector users to raise awareness of falls prevention, detection, response, and best practice for professionals. Includes the [FallCheck app](#) for those at risk of falling at home, or their families, friends or carers.
- Community Gateway CIC, ['Maximising the potential for the use of Assistive Technology'](#): An information toolkit to support people with dementia, their carers and dementia services.

NHS England will consider how the NHS can engage with the TECS market early in the lifecycle and ensure the market develops to deliver the most appropriate products and services which improve outcomes for patients and value for money to taxpayers.

## PROCUREMENT

### Commissioners' procurement checklist

This checklist can help you ensure that the right questions have been addressed when procuring TECS.

- Do we know the procurement routes and their benefits and limitations?
- Are there any appropriate procurement frameworks that will ease the burden of procuring the services and technology?
- What are the ongoing cost and revenue implications?
- How will TECS equipment integrate with existing information technology systems?
- Have we asked suppliers to build data provision for evaluation into the service?
- Have information governance requirements been taken into account?
- Have interoperability requirements been considered?

- Has flexibility been built into the procurement to enable you to respond to the rapidly changing market in technology?
- What regulatory or medical device standards are relevant?
- Is the service easily scalable and does it have any limitations?
- Can any performance criteria be included in contracts to ensure a stated level of performance of the equipment? If so, what are the criteria and what contractual penalties can be agreed?
- Should equipment be purchased outright or leased? If leased, for how long?
- What duration of equipment warranty should be purchased (where appropriate)?
- What peripherals (e.g. blood pressure cuffs) should be purchased or leased?

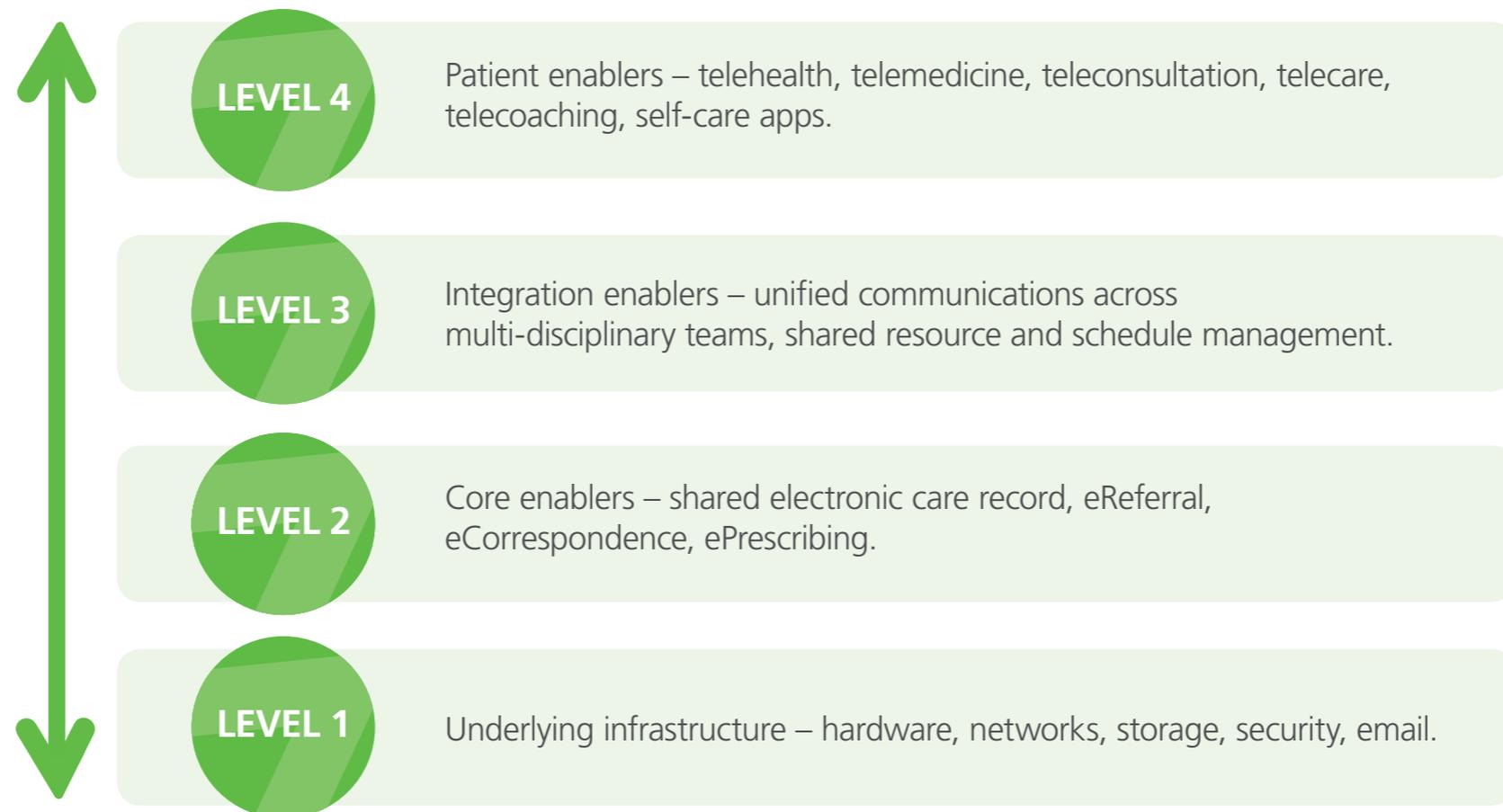
- Where peripherals such as weighing scales are going to be used, can patients use their own, can low cost ones be purchased or should approved scales be used which are calibrated annually?
- Should any training, change management support or subcontract services be externally purchased? If so, KPIs and deliverables will be required to support the contract negotiations.
- Have the maintenance and service contacts and costs been defined?
- Is it better to buy a fully managed service (which may be more costly than leasing but may provide other benefits)?
- What level of clinical monitoring is offered?
- Have any ongoing communications costs been defined e.g. 3G tariffs?

## IMPLEMENTING TECS

### Putting TECS in context

TECS can align with other work to transform healthcare through digital enablers. Information management and technology infrastructure across a local health economy should be aligned to drive improved information flows and better outcomes for patients. Any digital roadmap developed by commissioners should address all four levels outlined below.

#### TECHNOLOGY ENABLED CARE



## IMPLEMENTING TECS

### Information governance

Information is at the heart of enabling TECS. The table below is designed to help you place information governance at the centre of planning your TECS projects from the outset.

	People	Places	Devices
Strategic	<p>Has a Privacy Impact Assessment been conducted and a legal basis established?</p> <p>Has a clinical safety risk assessment around the use of data been conducted to identify risks and mitigations?</p>	<p>Have the business changes needed to deliver benefits been modelled?</p> <p>Have any information standards that apply been identified? Does the proposed solution comply with these standards?</p>	<p>Have information standards that keep data secure in transit and at rest been identified? Do the devices and systems and systems employed have the necessary level of medical device certification?</p> <p>Do we know how data integrity across all devices and systems will be assured? Implications of legal, governance, data accuracy, and IT standards must be understood.</p>
Procurement	<p>Is the Information Governance (IG) team involved in evaluating the product or responses to tender?</p>	<p>Has the proposed technology been implemented in a similar environment? Do you have access to IG lessons and processes learned from this implementation?</p>	<p>Do the proposed solution(s) meet identified standards and regulations?</p> <p>What device safety checks and approvals are required prior to use, e.g. PAT (Portable Appliance Testing)?</p>
Implementation	<p>Have you identified whose responsibility it will be to gain patient consent for data sharing with new services?</p> <p>Has the programme identified who will lead the ongoing fair processing campaign to inform patients about the use of their data?</p>	<p>Have the information flows been mapped and legal basis established to record patient consent?</p> <p>Has a business change plan been produced that links to benefits realisation and includes IG implications of changes?</p>	<p>Is data integrity across all devices and systems assured?</p> <p>Have processing for data validation, data quality and record keeping been tested?</p>

**You can find links to further information in the 'Resources' section, including links to the IG toolkit. Further detailed guidance on information governance will be developed in 2015.**

It is important to take into consideration issues around confidentiality and legal consent when sharing population level data as well as when sharing information for direct care. The Health and Social Care Information Centre's **Guide to Confidentiality in Health and Social Care** sets out five clear rules for information sharing as part of a person's direct care.

## IMPLEMENTING TECS

### Key steps



Who are the stakeholders for TECS? What are their needs?

Does the project have clinical and social care leadership? Does this include finance leads?

What is our strategy for patient, provider and public engagement? What training or support will patients, care providers and carers need?

How will TECS impact on the workforce?

What training and change management are needed? Who will lead the project?

How will the workforce be consulted?

Do partners understand their roles and responsibilities?

Are appropriate governance structures in place?

What services should be included? Is finance in place across partners? Has benefits realisation been scoped and agreed?

Have all partners including commissioners, clinicians, patients, carers and suppliers been involved in redesigning the new pathway? Have the revised pathways been approved and communicated by all relevant parties?

Have existing resources and funding streams been mapped to understand how they can support delivery of TECS?

Have clinical protocols and plans to recruit patients been developed?

Will equipment be interoperable with existing technologies? What infrastructure is required?

What are the risks and how are they mitigated?

Are the benefits clearly defined and how will we know when they are realised?

How will we move users off TECS?

Will the evaluation measure impact on the individual, the service and the whole health economy?

What plans are needed for evaluation?

How will findings feed into further improvement of the service?

## IMPLEMENTING TECS

### Commissioners' implementation checklist

This checklist can help you ensure that the right questions have been addressed when implementing TECS.

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> Who will develop and lead the change strategy to ensure the correct people are informed of the forthcoming changes and drive the agenda through to completion?</li> <li><input type="checkbox"/> How will we win hearts and minds of clinicians, social care, patients, carers and key partners?</li> <li><input type="checkbox"/> What are the anticipated barriers to change?</li> <li><input type="checkbox"/> Is there an overview document of the vision that can be shared with managers, suppliers, staff and patients?</li> <li><input type="checkbox"/> Has a comprehensive communication plan been written which details the benefits to all parties?</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Do staff have the necessary skills and capabilities to deliver what is required? What training will be required?</li> <li><input type="checkbox"/> Is there a directory of TECS services for our local health economy/region? Who is responsible for updating it?</li> <li><input type="checkbox"/> Is there an agreed process for patient recruitment/referral: who does what, when, and what information is provided? This should be clearly defined and replicable.</li> <li><input type="checkbox"/> Who will be responsible for gaining patient consent for data sharing with new services?</li> <li><input type="checkbox"/> Have clinical governance protocols been developed?</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> How will implementation with each patient/carer be reviewed? How will this impact on other services?</li> <li><input type="checkbox"/> Has a process for the baseline assessment of a person's needs, preferences and existing assistive technology been established?</li> <li><input type="checkbox"/> How does this fit with social care eligibility? Where do self-funders fit into the TECS model?</li> <li><input type="checkbox"/> Has IT system functionality and how it links to all health and social care systems been defined?</li> <li><input type="checkbox"/> How will technology be funded, distributed, installed and maintained?</li> <li><input type="checkbox"/> Have plans been agreed as to how the TECS programme will be monitored and managed?</li> </ul> |
|--|--|---|

## MEASURING IMPACT

### Overview

**How good are the services we commission in terms of quality and value?  
How do we know how good they are?**

#### Purpose of measuring the impact of TECS

Measurement of TECS should demonstrate its value to patients, commissioners, the NHS, social care, and the economy. By encouraging the establishment of a robust evaluation for TECS programmes, we hope to:

- Enable commissioners to understand the value of the service and whether it is delivering against local ambitions.
- Enable TECS programmes to be scaled up or adjusted, depending on their ability to deliver the required outcomes. Access to robust data can support wider scale roll out as local decision-makers see the benefits from regular analyses.

Evaluation can also provide the evidence for withdrawal or changes to services that are not producing the desired change.

- Encourage a broad appraisal of TECS initiatives in order to build a more comprehensive evidence base for the use of technology.
- Support commissioners to build data collection and key performance indicators (KPIs) into procurement specifications.

**This section sets out the TECS Evaluation Framework and metrics, how and where data can be obtained for evaluation and how to use this to perform a cost-benefit analysis of TECS programmes.**

## MEASURING IMPACT

### Overview

#### Building the TECS evidence base

The evidence base for using technology to enhance care is large, complex and continuing to grow rapidly. TECS is a complex intervention involving people, process and technology, therefore results are dependent on all these elements. Existing evidence is based on a range of methodologies and can – in some contexts – provide mixed messages on the clinical and cost-effectiveness of TECS. This is why it is crucial to establish the evaluation process from the outset of a TECS project – to ensure all stakeholders can see the impact TECS is having in a particular locality. A list of evidence and recent studies can be found on the NHS England website and we would like to share your evaluations on this site to help others see the benefits TECS can deliver and build the evidence base for these solutions.

#### The TECS Evaluation Framework

The TECS Evaluation Framework covers six key areas which encourage a broad evaluation of TECS. We recommend that commissioners or project managers select a locally tailored metric or metrics in each of these areas.

To reduce the burden of data collection and ensure alignment with other measurement priorities, the example metrics have been mapped against:

- **NHS Outcomes Framework.**
- **Adult Social Care Outcomes Framework.**
- **Public Health Outcomes Framework.**
- **Quality and Outcomes Framework.**
- **Better Care Fund Metrics.**

## MEASURING IMPACT

### Approaches to evaluation

It is important to recognise that any evaluation of TECS should be an evaluation of the overall performance of a service. It is very difficult to focus solely on the impact of the technology itself and attribute benefits entirely to the technology component of a service.

**Below are some examples of various approaches to evaluation and an overview of when they may be appropriate to deploy:**

 'Before and after'	 Quasi-control	 Control group
<ul style="list-style-type: none"> <li>• Compares activity or outcomes before and after implementation of TECS.</li> <li>• Can be based around individual patients or service outcomes (e.g. rates of success from a smoking cessation service).</li> <li>• Pragmatic, cost efficient and simple, but has some limitations.</li> </ul>	<ul style="list-style-type: none"> <li>• Comparing TECS patient outcomes against outcomes in a similar group.</li> <li>• Level of matching can be very simple or very complex.</li> <li>• Robustness depends on accuracy of matching.</li> </ul>	<ul style="list-style-type: none"> <li>• Randomised controlled trial (RCT) can provide robust evidence.</li> <li>• Not always appropriate for complex interventions such as TECS.</li> <li>• Expensive and time-consuming; more suited to research than evaluation.</li> </ul>

## MEASURING IMPACT

### Evaluation issues and suggestions

The table below highlights issues to be aware of when designing your TECS evaluation and suggestions on how to address them.

Issues	Suggestions
Determining to what extent change can be attributed to the technology element of the service.	Consider using a randomised control trial or a quasi randomised control trial as this is the best way to control for other factors.
A randomised control may not be practical.	A quasi randomised control trial (e.g. propensity score matching as used in the Bosch Buddy example or a before and after methodology).
Sample size is important both for statistical significance and economies of scale.	The sample size needs to be big enough for statistical validity and to allow for economies of scale, but small enough to take into consideration the inherent risk associated with testing something that may not work.
Establishing the follow up period.	Where possible, quarterly data collection for formative evaluation is recommended to demonstrate impact and inform continuous improvement to the programme.
A baseline is needed against which to measure progress.	The comparison could be between the same group of patients before and after an intervention or between a control and intervention group.
It can be difficult to quantify benefits. Using Quality Adjusted Life Years (QALYs) may be impractical.	Quality Adjusted Life Years, mortality rates, comparative activity rates and qualitative feedback from surveys can all be used to compare the IT based service against a baseline.



## MEASURING IMPACT

### Evaluation issues and suggestions - continued

Issues	Suggestions
Potential for high patient drop out rates.	When recruiting patients for the evaluation, consider recruiting more patients for the intervention arm to mitigate potentially high drop out rates.
The need to ensure confidentiality.	Using an external interviewer and conducting the interview over the phone may make the patients feel at ease and assure them that their interview is confidential. Participants should be informed beforehand of how their interview answers will be used and reminded about the confidentiality of their data.
Evaluation can be time consuming and resource intensive.	Group interviews or think tanks may be used to save time and resources. However it is important to ensure that quieter people are not drowned out and that the interviewees do not influence each others' answers. Conducting the interviews over the phone could save time.
Low response rate.	Collect multi channel feedback including online, by phone/text or post. It is worth sending reminders (through various channels) to patients to complete the questionnaire and return it. Patients could be asked to complete the questionnaire while in the waiting room at their next appointment.
People may interpret each question differently and respond accordingly.	It is worth keeping the questions as simple and uncomplicated as possible.



## MEASURING IMPACT

### The TECS Evaluation Framework

The TECS Evaluation Framework is designed to measure a range of benefits for the individual, commissioner and wider economy. Click on a measure within the evaluation framework to see suggested metrics and technical specifications, case studies and potential issues to consider when designing the evaluation. Click [here](#) to see an example of how these can be used in a cost-benefit analysis.

#### PERSONAL GOAL METRIC



This measures how TECS can support individuals' goal attainment (within the context of their social care plan and/or LTC). Goals are set by the individual patient or informal carer in consultation with their healthcare professional or social worker. Specific goals could include retaining or regaining independence and confidence, lowering blood pressure, being able to walk in the park, or returning to work. This will test the premise that the appropriate use of TECS will empower patients, support carers and improve lives.

#### KEY RISK INDICATOR



This could measure the effectiveness of TECS in slowing the progression of illness, frailty or the loss of independence; or accelerating rehabilitation, self-management or reablement. This measure will test the premise that appropriate use of TECS could help reduce dependence on and use of primary and secondary services, domiciliary or care home support by people with LTCs, lifelong disabilities or frailty.

#### SERVICE UTILISATION METRIC



This could measure the effectiveness of TECS to reduce avoidable or unplanned service activity by evaluating the cost avoided and capacity released as a result of these technologies. This would demonstrate the increase in efficiency of service delivery and the net-positive cost impact on a local health economy.

## MEASURING IMPACT

### The TECS Evaluation Framework - continued

#### PATIENT EXPERIENCE METRIC



This could measure the impact that TECS have on patient and carer experience and satisfaction levels. This could also include the Patient Activation Measure (PAM) to measure the levels of knowledge, skills and confidence people have in managing their own health and care.

#### SOCIO-ECONOMIC IMPACT METRIC



This could demonstrate the wider societal impact of TECS, by measuring levels of social contact, happiness or quality of life of patients and informal carers using these technologies, for example. This could also demonstrate the contribution of TECS to the UK economy by measuring the employment levels of patients and carers.

#### STAFF ENGAGEMENT EVALUATION



This could provide insight on staff engagement levels, satisfaction and views on the value of TECS which could help to further improve the service.

## MEASURING IMPACT

### Capturing the costs of the technology enabled care service

When evaluating the impact of a TECS service, as well as capturing the direct costs of the service it is important to consider costs per patient and how these might vary with the scale of implementation. Consideration of economies of scale is important before implementation as well as during evaluation.

Direct Costs	£	Costs per patient	Scenario 1 (£)	Scenario 2 (£)	Scenario 3 (£)
In-house staff costs		Equipment costs per participant			
Computer hardware and peripherals					
Computer software		Other direct costs per participant <i>(excluding project management and contracting costs)</i>			
Installation					
Contract costs/fees to other organisations		Total Costs			
Total Costs					

## MEASURING IMPACT

### Capturing the costs of service utilisation

A technology enabled care service may impact on different health services and costs, so baselines need to be captured across relevant settings. A technology-based service is likely to lead to demand moving between settings.

	Without TECS	With TECS	Change
Hospital costs			
Primary care costs			
Care home respite costs			
Community care costs			
Mental health care costs			
Day care costs			
Adaptation costs			
Equipment costs			
Medication costs			

The above table covers key care settings. For the evaluation of any specific TECS, this table could be completed for the key settings affected by service redesign to show how care may increase or decrease in each. Where tariff is available, cost may be represented as activity multiplied by mean tariff.

## MEASURING IMPACT



### PERSONAL GOAL METRIC - OVERVIEW

The purpose of the personal goal metric is to measure how technology-based services can support individuals' goal attainment (within the context of their social care plan and/or long term conditions). Individuals set personal goals and their progress against these is measured.

The table below sets out a number of possible metrics to consider for evaluation, the outcomes framework(s) they align with, and where to find the technical specification which details how and where data for that metric is collected.

Click on the links to find details of data sources, reporting frequencies and calculation methodologies

Metric	Alignment with	Technical specification
Proportion of people who use services who have control of their daily lives	Adult Social Care Outcomes Framework	See page 12 of <a href="#">technical specification</a>
Excess weight in adults	Public Health Outcomes Framework	See page 68 of <a href="#">technical specification</a>
Smoking prevalence	Public Health Outcomes Framework	See page 70 of <a href="#">technical specification</a>

## MEASURING IMPACT



### PERSONAL GOAL METRIC - TESTING ITS USE

The example below suggests that the Goal Attainment Score (GAS) may be used as a responsive instrument for evaluation.

Example	Method	Measure	Reported Impact	Further reading
<p>An Individualized Approach to Outcome Measurement in Geriatric Rehabilitation.</p> <p>This study investigated the reliability, validity, and responsiveness of GAS as an outcome measure in geriatric rehabilitation who have control of their daily lives.</p>	<p>Correlation with other measures such as the <a href="#">Mini Mental State Examination</a> and the <a href="#">Nottingham Health Profile</a>.</p>	<p>Correlation with other measures such as the Mini Mental State Examination and the Nottingham Health Profile.</p>	<p>GAS appears to be a feasible, reliable, valid, and responsive approach to outcome measurement in geriatric rehabilitation.</p>	<p><a href="#">GAS for geriatric rehabilitation.</a></p>

## MEASURING IMPACT



### PERSONAL GOAL METRIC - ISSUES AND SUGGESTIONS

The example below suggests that the Goal Attainment Score (GAS) may be used as a responsive instrument for evaluation.

Issues	Suggestions
GAS could be an implementation intervention as well an evaluation measure.	The GAS might be considered as an implementation tool because using the GAS could in itself result in an improvement in a patient's condition.  One approach could be to use another instrument (e.g. EQ5D) and either a before and after or quasi RCT method to compare the impact of a technology based service with and without GAS.
Goals are set for individual patients. So, in order to evaluate a TECS service, scores will need to be aggregated to compare impact for those with the technology enabled care intervention against those with usual care. Individuals' goals may be very different and it is not clear how the method of aggregation could address this.	Goals could be converted into potential health gains (for example QALYs) which could then be aggregated.
Using clinician time for goal attainment scoring is resource intensive.	To save clinician time, patients could be asked to self-score, or scoring could be conducted by non-clinical staff.

## MEASURING IMPACT



### KEY RISK INDICATOR - OVERVIEW

The key risk indicator could measure the effectiveness of TECS in slowing the progression of illness, frailty or the loss of independence; or accelerating rehabilitation, self-management or reablement.

The table below sets out a number of possible metrics to consider for evaluation, the outcomes framework(s) they align with, and where to find the technical specification which details how and where data for that metric is collected.

Click on the links to find details of data sources, reporting frequencies and calculation methodologies

Metric	Alignment with	Technical specification
The percentage of patients with coronary heart disease, hypertension, PAD, STIA, and diabetes in whom the last blood pressure reading (measured in the preceding 12 months) is 150/90 mmHg or less.	Quality Outcomes framework	See page 16 of <a href="#">technical specification</a>
CKD002. The percentage of patients on the CKD register in whom the last blood pressure reading (measured in the preceding 12 months) is 140/85 mmHg or less.		
DM004. The percentage of patients with diabetes, on the register, whose last measured total cholesterol (measured within the preceding 12 months) is 5 mmol/l or less.		
DM007-9. The percentage of patients with diabetes, on the register, in whom the last IFCC-HbA1c is 59, 64 or 75 mmol/mol or less in the preceding 12 months.		

## MEASURING IMPACT



### KEY RISK INDICATOR - EVALUATION EXAMPLE

Example	Method	Measure	Reported Impact	Further reading
<p>Evaluation of a mobile phone telemonitoring system for glycaemic control in patients with diabetes.</p> <p>Examining the effectiveness of a sensor which transmitted blood glucose readings to a mobile phone via a Bluetooth wireless link to clinicians on the level of HbA1c in diabetic patients.</p>	RCT	HbA1c	In a sub-group analysis of the patients who completed the study, the telemonitoring group had a lower HbA1c than those in the control group: 7.76% and 8.40%, respectively (P =0.06).	<a href="#">Glycaemic control study</a>
<p>Mortality risk for diabetes patients in a care coordination, home-telehealth programme. Patients in the intervention group used a messaging device in the home. Care coordinators monitored the answers from the devices daily so that early interventions could be made.</p>	Intervention and retrospective control group	Mortality	<p>There were significantly more deaths in the control group (n=102, 26%) compared with the intervention group (n=75, 19%).</p> <p>There was longer survival for the intervention group versus the control group (mean survival time 1348 vs 1278 days; P=0.015). A multivariate analyses indicated that the telemonitoring programme was associated with reduced 4-year all-cause mortality.</p>	<a href="#">Mortality risk study</a>

## MEASURING IMPACT



### KEY RISK INDICATOR - ISSUES AND SUGGESTIONS

Issues	Suggestions
<p>Risk indicators need to be related to health gains.</p>	<p>In the study on 'mortality risk', the measurement of mortality is clearly a health-related measure. However, in the 'glycaemic' study the health gain associated with lower blood sugar is not clearly set out. Other risks that could be measured include risks of hospitalisation, exacerbation etc.</p>

## MEASURING IMPACT



### SERVICE UTILISATION - OVERVIEW

The service utilisation measure can be used to evaluate whether the implementation of technology enabled care has supported a reduction in avoidable or unplanned service activity (for example hospital admissions, GP appointments, permanent admissions to nursing homes etc.).

The table below sets out a number of possible metrics to consider for evaluation, the outcomes framework(s) they align with, and where to find the technical specification which details how and where data for that metric is collected.

Click on the links to find details of data sources, reporting frequencies and calculation methodologies

Metric	Alignment with	Technical specification
Emergency readmissions within 30 days of discharge from hospital.	Public Health Outcomes Framework NHS Outcomes Framework	See page 125 of <a href="#">technical specification</a>
Permanent admissions to residential and nursing homes per 100,000 population.	Adult Social Care Outcomes Framework Better Care Fund	See page 32 of <a href="#">technical specification</a>
Proportion older people (65+) who were still at home 91 days after discharge from hospital into reablement / rehabilitation services.	Adult Social Care Outcomes Framework NHS Outcomes framework Better Care Fund	See page 36 of <a href="#">technical specification</a>
Unplanned hospitalisation for chronic ambulatory care sensitive conditions.	NHS Outcomes Framework	See section 2.31 of <a href="#">technical specification</a>
Emergency admissions for acute conditions that should not usually require hospital admissions.	NHS Outcomes Framework	See section 3a of <a href="#">technical specification</a>

## MEASURING IMPACT



### SERVICE UTILISATION - EVALUATION EXAMPLES

Example	Method	Measure	Reported Impact	Further reading
Telehomecare, Chronic Patients and the Integrated Healthcare System (TELEKAT).	RCT.	Rate of hospital admissions.	The study was conducted across settings and patients were recruited from a health centre, GP or a pulmonary hospital ward. Admission rates per patient were 0.49 for the tele-rehabilitation and 1.17 for standard care and hospitalisation costs for the tele-rehabilitation group were 3,461 per patient compared with a cost of 4,576 per patient for standard care.	<a href="#">TELEKAT.</a>
Telehealth used by the elderly with congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD) and/or diabetes mellitus (DM).	Propensity score matching methodology.	Propensity score matching methodology.	Reduction in inpatient admissions for those making recommended use of the Bosch Buddy.	<a href="#">Bosch Buddy.</a>

## MEASURING IMPACT



### SERVICE UTILISATION - EVALUATION EXAMPLES

Example	Method	Measure	Reported Impact	Further reading
TELESCOT example is a small sample sized telehealth study in Scotland.	RCT.	Number/duration of hospital.	Telehealth had little impact on rates of admission compared with usual care.	TELESCOT
Whole System Demonstrator (WSD).	RCT.	Analysis of rates of activity across a wider range of settings.	The study looked at impact across a wide range of settings (e.g see p 76). Although statistically-significant reductions were found in the hospital admission proportion and numbers of emergency admissions, wide confidence intervals meant that not possible to conclude telehealth patients incurred lower secondary care costs.	WSD

## MEASURING IMPACT



### SERVICE UTILISATION - ISSUES AND SUGGESTIONS

For generic issues and suggestions relevant to measuring service utilisation, please see pages [79](#) and [81](#)

Issues	Suggestions
<p>Cost changes associated with activity changes are also the indirect cost associate with the technology enabled care service. It may not be possible to comprehensively consider services.</p>	<p>It is necessary to focus on rates of activity for those services where it is anticipated that the IT based service will lead to a shift in care. These will then feed into the assessment of the overall costs. <a href="#">Page 84</a> contains a template for service utilisation costs.</p>

## MEASURING IMPACT



### PATIENT EXPERIENCE - OVERVIEW

The patient experience measure can be used to evaluate the impact that TECS have on patient and carer experience and satisfaction levels. This could also include the Patient Activation Measure (PAM) to measure the levels of knowledge, skills and confidence people have in managing their own health and care.

The table below sets out a number of possible metrics to consider for evaluation, the outcomes framework(s) they align with, and where to find the technical specification which details how and where data for that metric is collected.

Click on the links to find details of data sources, reporting frequencies and calculation methodologies

Metric	Alignment with	Technical specification
Overall satisfaction of people who use services with their care and support.	Adult Social Care Outcomes Framework.	See page 45 of <a href="#">technical specification</a> .
Improve peoples' experience of healthcare.	NHS Outcomes Framework.	See page 24 of <a href="#">technical specification</a> .
Friends and Family Test.	NHS Outcomes framework.	See page 51 of <a href="#">technical specification</a> .

## MEASURING IMPACT



### PATIENT EXPERIENCE - EVALUATION EXAMPLE

Example	Method	Measure	Reported Impact	Further reading
<p>Patient satisfaction with a nurse-led, telephone-based disease management service in Birmingham. The aim was to improve the health outcomes of up to 2000 patients with high risk, long term conditions. In August 2006, 506 questionnaires with 30 five-point <b>Likert-type questions</b> and three free-text questions regarding their overall feedback were posted to patients and 128 were returned within four weeks.</p>	<p>The first 506 patients who had a complete initial assessment undertaken by care managers were sent a postal survey and a reminder.</p>	<p>30 five-point <b>Likert-type questions</b> and three free-text questions.</p>	<p>96% of the respondents strongly agreed or agreed that they were satisfied with the quality of service being provided by the care managers.</p>	<p><b>Birmingham.</b></p>



For generic issues and suggestions relevant to measuring service utilisation, please see pages [79](#) and [81](#)

## MEASURING IMPACT



### PATIENT EXPERIENCE - EVALUATION EXAMPLE

Example	Method	Measure	Reported Impact	Further reading
<p>Patients' experience of a telephone booster intervention to support weight management in Type 2 diabetes and its acceptability.</p> <p>Semi-structured interviews were conducted with the intervention group participants to explore their views and experiences.</p>	<p>Randomised control group.</p>	<p>Semi-structured exit interview focussing on satisfaction with the telephone follow-up, the lifestyle change during the intervention, their experiences of the intervention.</p>	<p>The patients were satisfied or very satisfied with the telephone calls and most would recommend the intervention to others in a similar situation. The benefits arising from the telephone calls included:</p> <ul style="list-style-type: none"> <li>• being reminded to comply with their regimen;</li> <li>• prompting and motivating adherence to diabetes self care behaviours;</li> <li>• improved self-esteem;</li> <li>• and feeling 'worthy of interest'.</li> </ul>	<p>Weight management.</p>



For generic issues and suggestions relevant to measuring service utilisation, please see pages 79 and 81

## MEASURING IMPACT



### SOCIO-ECONOMIC IMPACT - OVERVIEW

The socio-economic metric could demonstrate the wider societal impact of TECS, by measuring levels of social contact, happiness or quality of life of patients and informal carers using these technologies, for example. This could also demonstrate the contribution to the UK economy made by TECS by

measuring the employment levels of patients and carers.

The table below sets out a number of possible metrics to consider for evaluation, the outcomes framework(s) they align with, and where to find the technical specification which details how and where data for that metric is collected.

Click on the links to find details of data sources, reporting frequencies and calculation methodologies

Metric	Alignment with	Technical specification
Health-related quality of life for older people.	Public Health Outcomes Framework.	See 4.13 of <a href="#">technical specification</a>
Proportion of people who use services who have control of their daily lives.	Adult Social Care Outcomes Framework.	See 1b of <a href="#">technical specification</a>
Proportion of people who use services and their carers, who reported that they had as much social contact as they would like.	Adult Social Care Outcomes Framework .	See 1i of <a href="#">technical specification</a>
Employment of people with LTCs.	NHS Outcomes Framework.	See 2.2 of <a href="#">technical specification</a>
Employment for those with an LTC including those with a learning difficulty/disability or mental illness.	Public Health Outcomes Framework.	See 1.8 of <a href="#">technical specification</a>
Sickness absence rate.	Public Health Outcomes Framework.	See 1.9 of <a href="#">technical specification</a>

## MEASURING IMPACT



### SOCIO-ECONOMIC IMPACT - EVALUATION EXAMPLES

Example	Method	Measure	Reported Impact	Further reading
Telemedicine for Reach, Education, Access, and Treatment (TREAT): Linking Telemedicine With Diabetes Self-management Education to Improve Care in Rural Communities.	Patients were assessed by survey at baseline and follow-up.	Bespoke survey.	Significant improvement in empowerment and self-care.	<a href="#">TREAT.</a>
Internet-delivered cognitive behavioural therapy for adults with mild to moderate depression and high cardiovascular disease risks.	RCT.	<a href="#">Depression (PHQ9).</a>	A small, but robust, improvement in depressive symptoms.	<a href="#">Internet CBT.</a>
Economic evaluation of Manitoba Health Lines in the management of congestive heart failure.	RCT.	QALYs derived from the <a href="#">SF36.</a>	Health Contact programme preferable to standard care.	<a href="#">Manitoba CHF.</a>



Other instruments: Generic: [EQ5D](#), Disease specific: [Heart Failure Questionnaire](#), [Heart Failure Index](#), [Anxiety](#), [Respiratory Questionnaire](#)

## MEASURING IMPACT



### SOCIO-ECONOMIC IMPACT - EVALUATION EXAMPLES

Example	Method	Measure	Reported impact	Further reading
A low-cost tele-imaging platform for developing countries.	No formal method.	Low cost delivery.	Offers a major opportunity for telemedicine in developing countries. Formal evaluation needed.	<a href="#">Teleimaging.</a>
Evaluation of home telemonitoring.	RCT.	<a href="#">SF36.</a>	No improvement in SF-36 Scores.	<a href="#">RCT Telemonitoring.</a>
Whole System Demonstrator Telehealth: Carer outcomes Telecare Informal Carer outcomes.	Two armed and baseline and follow up surveys.	Telehealth used <a href="#">SF12</a> (and other see study) Telecare used a before and after questionnaire approach.	No specific impact on perception of carer burden nor subjective components of burden.	<a href="#">WSD</a> (final report - see 4.8, 5.4).



Other instruments: Generic: [EQ5D](#), Disease specific: [Heart Failure Questionnaire](#), [Heart Failure Index](#), [Anxiety](#), [Respiratory Questionnaire](#)

## MEASURING IMPACT



### SOCIO-ECONOMIC IMPACT - ISSUES AND SUGGESTIONS

For generic issues and suggestions relevant to measuring service utilisation, please see pages [79](#) and [81](#).

Issues	Suggestions
There are no examples that directly evaluate the impact on sickness absence or ability to work.	Questions on the impact on sickness absence and ability to work could be included in both patient and carer surveys.
Improved management of a condition may translate to modest improvements in quality of life measures.	TECS are usually used to manage conditions rather than as a cure. Better management of a condition may lead to relatively modest improvements in quality of life scores. It is important that scores do not decrease. Given that any increases may be small, it is important to look at these scores in the context of wider cost benefit analysis.
A key limitation of instruments is the assumption that equal improvements in scores are of equal benefit to two different patients.	Patients will have different baseline health status . Instruments generally assume the same improvements in scores are of equal value regardless of the baseline health status of the patient. In reality the same change in scores for two patients with differing baselines may not be of equal benefit. The patient with the lower baseline may benefit more. This needs to be taken into account in any evaluation.

## MEASURING IMPACT



### STAFF ENGAGEMENT EVALUATION - OVERVIEW

A staff engagement evaluation could be used to provide insight on staff engagement levels, satisfaction and views on the value of TECS which could help to further improve the service.

Clinical engagement is a key requirement to build a successful technology enabled care service. Measurement of staff

engagement levels, satisfaction and views on the value of TECS can help to further improve the service.

The table below sets out a number of possible metrics to consider for evaluation, the outcomes framework(s) they align with, and where to find the technical specification which details how and where data for that metric is collected.

Click on the links to find details of data sources, reporting frequencies and calculation methodologies

Metric	Alignment with	Technical specification
Training and education for staff.	Education Outcomes Framework.	See page 13 of <a href="#">technical specification</a> .
Staff contribution to service improvement activities.	Education Outcomes Framework.	See page 15 of <a href="#">technical specification</a> .
Staff opinion on the standard of care provided by their employing organisation.	Education Outcomes Framework.	See page 16 of <a href="#">technical specification</a> .

## MEASURING IMPACT



### STAFF ENGAGEMENT EVALUATION - EVALUATION EXAMPLES

Example	Method	Measure	Reported Impact	Further reading
To investigate barriers and facilitators to mainstreaming telehealth in the community – exploring staff views and roles at the implementation and delivery phase.	Case studies and interviews.	Qualitative analysis.	Impact of telehealth was affected by staff acceptance. Effective implementation hinges on the acceptance of frontline staff, who are the gatekeepers to patients and telehealth success.	<a href="#">Barnsley.</a>
To investigate telehealth care for people with LTCs from the perspective of the front-line health professional.	Structured interviews with health professionals.	Qualitative analysis.	Impact of telehealth was affected by staff acceptance. Healthcare professionals will need to develop a shared understanding of patient self-management through telehealth. This may require a renegotiation of their roles and	<a href="#">WSD.</a>
To investigate the use of videoconferencing to share expertise and surgical knowledge. Three main factors were assessed: organisational development, telemedicine activity and perceptions of the key players.	Open ended interviews.	Qualitative analysis.	Most chief executives of the rural hospitals were interested in furthering their use of clinical telemedicine applications. The data also indicated a great need for education, particularly of the rural physicians. The overall view of those surveyed about the telemedicine programme	<a href="#">Michigan.</a>
To investigate the acceptance of telemedicine in surgery.	Questionnaire.	Qualitative analysis.	Telemedicine in surgery may be advanced by creating surgical networks for teleconsultation and tele-education.	<a href="#">Swiss.</a>

## MEASURING IMPACT

### Cost benefit analysis

This table shows an illustrative cost benefit analysis for a telehealth service for diabetes patients. The cost benefit analysis should help to answer the following questions:

- Will the proposed technology enabled service lead to reduced costs with at least the same benefits compared with the baseline?
- Will it lead to the same cost with greater benefits for patients compared with the baseline?
- Will the costs of the technology enabled care service result in a greater benefit than the same cost of an alternative e.g. extra emergency care resource?

#### BENEFITS

	Without TECS	With TECS	Change
1. Personal goal metric.	Patients struggle to achieve personal goals.	Patients achieve some personal goals.	Patients feel empowered by the service.
2. Key risk indicator.	High fluctuation in blood sugar level.	More stable blood sugar levels.	Reduced risk of amputation/blindness.
3. Service utilisation metric.	Hospital care high, primary care low.	Less hospital care and more primary care.	Reduced cost.
4. Patient experience metric.	Frequent emergency admissions.	Home monitoring and occasional GP visits.	Patient feels better supported.



## MEASURING IMPACT

### Cost benefit analysis

#### BENEFITS

	Without TECS	With TECS	Change
5. Socio-economic impact metric.	Frequent sickness absence associated with managing their diabetes.	Almost normal sickness absence.	Reduced sickness absence Improved quality of life score.
6. Staff engagement evaluation.	Added pressure for A&E staff.	Primary care staff think the technology enabled care service is good for them and patients.	Improved overall staff satisfaction.
Overall assessment of benefits.			Significant cumulative benefits.
Overall cost of service provision.	High cost hospital care	Cost of TECS and changes in costs as care is shifted closer to home.	Added cost of TECS in the community is offset by reduced cost of hospital care.

**Summary Cost-Benefit Analysis:** There are benefits across all parts of the evaluation framework and the overall technology enabled care service represents a cost saving compared to the existing service.



## MEASURING IMPACT

### Commissioners' evaluation checklist

This checklist can help you ensure that the right questions have been addressed when designing the evaluation of TECS.

- Do the major stakeholders agree on the programme's metrics?
- To what extent are evaluation requirements built into vendor contracts?
- Are data sharing agreements in place to enable evaluation?
- Has a good quality and comprehensive baseline been established?
- Who is responsible for ensuring that the evaluation procedures are known by the appropriate staff and that the required data are being gathered at the appropriate times?

- Is the representation of metrics made more accessible through use of a dashboard?
- Who is going to review data to ensure the data being gathered are of the required quality, quantity and frequency?
- Are the metrics being viewed by a senior team in both provider and commissioner organisations? How will the evaluation inform continuous improvement?
- Are the metrics timely enough to inform strategic planning and funding decisions?
- Are the sample sizes and make-up sufficiently robust to allow generalisation?
- Are the inter-organisational benefits being assessed with delivery partners?

- Are metrics simple and straightforward to explain?
- Do we understand the difference between *performance metrics* (which define what is going on in a process) and *diagnostic metrics* (which explain why a process performs the way it does)? How are changes to the service recorded to allow subsequent alignment with service performance metrics?
- Is the service being delivered in practice the same as the one envisaged?
- Has a duty for the supplier to capture any patient-generated data, such as goal-setting or patient recorded experience measures, been built into service specifications?

## CONTINUOUS IMPROVEMENT

### Case studies

These case studies demonstrate how TECS have directly improved outcomes for patients and supported the delivery of cost effective, patient-centred services through a variety of different technologies, approaches and settings. These successful initiatives share a number of common themes, including strong clinical advocacy and ownership for the new programme and a TECS service that has been embedded as part of an end-to-end care pathway.

Click [here](#) to learn how Airedale NHS FT deploys telemedicine in prisons, care homes and in patients' own homes to reduce the numbers of vulnerable people and people with one or more LTC being admitted unnecessarily to hospital.

Click [here](#) to learn how Spire Healthcare's Montefiore Hospital in Brighton has used Sensium Healthcare to wirelessly monitor patients' vital signs and reduced the cost of their stay by £3k.

Click [here](#) to learn how NHS Ayrshire and Arran has used Medvivo HomePods to connect a widely dispersed population with specialist COPD care, reducing GP appointments by 26% and emergency admissions by 70%.

Click [here](#) to learn how West Midlands AHSN / Stoke-on-Trent CCG has used the 'Florence' SMS text system to enable interactions between patients and clinicians in various health and social care settings.

Click [here](#) to learn how County Durham and Darlington CCG implemented remote INR monitoring for patients using anti-coagulants, delivering a cost-effective, flexible and popular service.

Click [here](#) to learn how Kernow CCG and Peninsula Community Health established a remote blood pressure monitoring service for patients at risk of falls due to suspected or confirmed postural hypotension, which has led to improved diagnosis and treatment.

## CONTINUOUS IMPROVEMENT

### Commissioners' checklist

This checklist can help you ensure that the right questions have been addressed when analysing the lessons learned from TECS.

- |   |  |  |
|---|--|--|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> Does TECS continue to align with organisational priorities?</li> <li><input type="checkbox"/> Is our organisation applying TECS consistently, over a sufficiently long timescale, with demonstrated, sustained organisational commitment and support?</li> <li><input type="checkbox"/> Are we routinely analysing the TECS metrics to inform evolution of the service?</li> <li><input type="checkbox"/> Are we involving health and care professionals, housing and the third sector, patients and carers in the evolving design of TECS services while providing adequate training and development?</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Are we bringing safety and quality benefits of TECS alive through patient and carer stories – in person, on video and in the media?</li> <li><input type="checkbox"/> Are TECS embedded in our cost improvement initiatives?</li> <li><input type="checkbox"/> How will recommendations from the review be incorporated into the future funding decision-making process?</li> <li><input type="checkbox"/> What information on progress should be put into the public domain and is there an effective communications campaign with key stakeholders?</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Do stakeholders understand what has been achieved and what is still required?</li> <li><input type="checkbox"/> How will TECS staff be valued, skills developed and career opportunities maintained?</li> <li><input type="checkbox"/> Is the appropriate infrastructure, resource and finance in place to secure the running of TECS while future service decisions are being made?</li> <li><input type="checkbox"/> Who approves service refinement and what consultation is required: what formal change control mechanisms are required?</li> </ul> |
|---|--|--|

## CONTINUOUS IMPROVEMENT

### What's next?

We will publish further subsections to this toolkit in 2015.  
These will provide more detailed advice and practical tools.

#### Coming in 2015 and what you will find inside:

##### Simplifying procurement

An exemplar procurement contract template with advice on how to build in interoperability and flexibility.

##### Implementation and change management

Detailed project and change management support, tools and templates.

##### Improvement

Continuous improvement best practice.

# RESOURCES



## REFERENCES AND FURTHER READING

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**The references and further reading section is structured around the following 5 areas, with subtopics within each one:**

## REFERENCES AND FURTHER READING



### STRATEGIC PLANNING

#### GENERAL INFORMATION SOURCES:

Technology Strategy Board

<https://www.gov.uk/government/organisations/innovate-uk>

Telecare Learning and Improvement Network

<http://www.telecarelin.org.uk/>

The Foundation for Assistive Technology (FAST)

<http://www.fastuk.org/home.php>

The Kings Fund

<http://www.kingsfund.org.uk/topics/telecare-and-telehealth>

More Independent (Mi) partnership

<http://www.moreindependent.co.uk/>

National Information Board's Framework for Action  
Personalised health and Care 2020

<https://www.gov.uk/government/news/introducing-personalised-health-and-care-2020-a-framework-for-action>

Practical guidance on the commissioning of technology  
enabled care services Tackling Telehealth: How CCGs can  
commission successful telehealth services.

<http://www.insidecommissioning.co.uk/article/1286743/ccgs-commission-successful-telehealth-services>

## REFERENCES AND FURTHER READING



### STRATEGIC PLANNING

#### EVIDENCE

The evidence base for using technology to enhance care is large, complex and continuing to grow rapidly. TECS is a complex intervention involving people, process and technology, therefore results are dependent on all these elements. The evidence is based on a range of methodologies and can – in some contexts – provide mixed messages on the clinical and cost-effectiveness of TECS. It would therefore be impractical and unhelpful to try and provide a definitive list of all studies on all TECS in all clinical areas. Instead, we have provided here a single paper for selected clinical areas. The papers are reviews of the existing evidence base, providing conclusions on where benefits from TECS are most likely to be found. A much wider list of individual studies can be found on the NHS England website at <http://www.england.nhs.uk/ourwork/qual-clin-lead/tecs/improvement/tecs-cs/>.

#### COPD EVIDENCE:

Telehealthcare for chronic obstructive pulmonary disease: Cochrane review and meta-analysis.  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3481514/>

PLEASE SEE FURTHER EVIDENCE ON THE NEXT PAGE



## REFERENCES AND FURTHER READING



### STRATEGIC PLANNING

#### CHF/CVD EVIDENCE:

Remote monitoring after recent hospital discharge in patients with heart failure: a systematic review and network meta-analysis <http://heart.bmj.com/content/early/2013/05/15/heartjnl-2013-303811.abstract>

#### DIABETES EVIDENCE:

Home telehealth for diabetes management: a systematic review and meta-analysis <http://heart.bmj.com/content/early/2013/05/15/heartjnl-2013-303811.abstract>

#### MENTAL HEALTH EVIDENCE:

Media-delivered cognitive behavioural therapy and behavioural therapy (self-help) for anxiety disorders in adults. <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD005330.pub4/full>

#### HYPERTENSION EVIDENCE:

Clinical usefulness and cost effectiveness of home blood pressure telemonitoring: meta-analysis of randomized controlled studies. <http://www.ncbi.nlm.nih.gov/>

## REFERENCES AND FURTHER READING



### STRATEGIC PLANNING

#### POLICY CONTEXT DOCUMENTS:

NHS Outcomes Framework

[www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/256456/NHS\\_outcomes.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/256456/NHS_outcomes.pdf)

Government Mandate

[www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/256406/Mandate\\_14\\_15.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/256406/Mandate_14_15.pdf)

Adult Social Care Outcomes Framework

[www.gov.uk/government/publications/adult-social-care-outcomes-framework-2014-to-2015](http://www.gov.uk/government/publications/adult-social-care-outcomes-framework-2014-to-2015)

Improving General Practice Phase One Report

[www.england.nhs.uk/wp-content/uploads/2014/03/emerging-findings-rep.pdf](http://www.england.nhs.uk/wp-content/uploads/2014/03/emerging-findings-rep.pdf)

Urgent and Emergency Care Review

[www.england.nhs.uk/2014/08/19/update-uec-review](http://www.england.nhs.uk/2014/08/19/update-uec-review)

7-Day Services

[www.england.nhs.uk/ourwork/qual-clin-lead/7-day-week/7ds](http://www.england.nhs.uk/ourwork/qual-clin-lead/7-day-week/7ds)

Integrated Care: Our Shared Commitment

[www.gov.uk/government/publications/integrated-care](http://www.gov.uk/government/publications/integrated-care)

'Transforming Participation in Health and Care, Guidance for Commissioners', NHS England 2013

<http://www.england.nhs.uk/wp-content/uploads/2013/09/trans-part-hc-guid1.pdf>

National Information Board's (NIB) Personalised Health and Care 2020 Framework for Action

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/376886/NHS\\_England\\_NIB\\_report.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/376886/NHS_England_NIB_report.pdf)

## REFERENCES AND FURTHER READING



### PROCUREMENT

The references and further reading section of the toolkit is structured around the following 5 areas, with subtopics within each one:

#### PROCUREMENT TOOLS:

Integrated Digital Care Fund (IDCF) Commercial Toolkit <http://www.england.nhs.uk/ourwork/tsd/sst/tech-fund/applying/>

#### INFORMATION SOURCES TO HELP SELECT TECS:

Telecare Services Association, telecare and telehealth: An introduction to some of the most widely used telecare and telehealth services today.

[www.mickshouse.info](http://www.mickshouse.info): This website shows telecare sensors and explains their functionality.

Disabled Living Foundation (DLF), '[Personal alarm systems and telecare factsheet](#)': The factsheet provides first stop information on the type of telecare systems available to help with specific difficulties, and details about the useful features of the technology.

[www.livingmadeeasy.org.uk](http://www.livingmadeeasy.org.uk): This site can help you identify products for health, independence and wellbeing from some of the UK's leading companies.

The DLF's [AskSARA tool](#) offers guided advice to help find the technologies that will best help an individual.

[AT Dementia](#) highlights technologies that support people with dementia and their carers.

'HFT Personalised Technology': Highlights technologies that support people with learning disabilities.

The HFT's [virtual Smart House](#) shows some of the technologies that a person with a learning disability may use around their home to improve their independence and increase their safety.

Social Care Institute for Excellence, [Ethical issues in the use of telecare](#).



## REFERENCES AND FURTHER READING



### PROCUREMENT

The references and further reading section of the toolkit is structured around the following 5 areas, with subtopics within each one:

#### INFORMATION SOURCES TO HELP SELECT TECS: (CONTINUED)

The King's Fund, Information technologies: a view of the emerging app market

<http://apps.nhs.uk>: This website provides NHS-approved apps

<http://everyday-life.co.uk>: A decision support aid designed to help patients and healthcare professionals to find the right technology solutions based on need.

**Royal College of Nursing, Telehealth and telecare:**

Definitions, potential benefits and impact, and developments across the UK.

Coventry University, **Innovation in supporting people at risk of falling**: Resources for health and social care professionals and potential fall detector users to raise awareness of falls prevention, detection, response, and best practice for professionals. Includes the FallCheck app for those at risk of falling at home, or their families, friends or carers.

Community Gateway CIC, Maximising the potential for the use of Assistive Technology: An information toolkit to support people with dementia, their carers and dementia services.

MEASURING IMPACT

IMPROVEMENT

## REFERENCES AND FURTHER READING



### IMPLEMENTING TECS

The references and further reading section of the toolkit is structured around the following 5 areas, with subtopics within each one:

#### IMPLEMENTATION TOOLKITS:

Skills for Care Commissioners Guide <http://cat.skillsforcare.org.uk/Commissioners-Guide>

Ready, Steady, Go: A telehealth implementation toolkit, National Institute for Health Research <http://clahrc-sy.nihr.ac.uk/images/resources/Ready%20Steady%20Go%20toolkit.pdf>

Assisted Living Technology and Services Learning and Development Framework, Skills for Care <http://www.skillsforcare.org.uk/Skills/Assisted-Living-Technologies/Assisted-living-technology.aspx>

Telehealth Resources at the Royal College of Nursing [http://www.rcn.org.uk/development/practice/e-health/telehealth\\_and\\_telecare](http://www.rcn.org.uk/development/practice/e-health/telehealth_and_telecare)

NHS Scotland Clinical eHealth Toolkit <http://www.ehealth.scot.nhs.uk/wp-content/documents/clinical-ehealth-toolkit-2603092.pdf>

Carers Scotland Carers and Telehealthcare Training Toolkit <http://www.carersuk.org/scotland/training-resources/telehealthcare>

Clinical Risk Management: Telehealth / Mobile Health Solutions - Implementation Guidance <http://www.isb.nhs.uk/documents/isb-0129/amd-39-2012/0129392012tele.pdf>

Clinical Safety Guidance <http://systems.hscic.gov.uk/clinsafety/intro>

Digital Health and Care Alliance: <http://www.dhaca.org.uk/index.html>

American Telemedicine Association resources: <http://learn.americantelemed.org/diweb/catalog/t/3104/c/96;jsessionid=D3033B424F1C307440F47B6745A83697.worker1>

*Continued on the following page...*



## IMPLEMENTING TECS

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Telehealth Resources Centre:

<http://www.telehealthresourcecenter.org/>

Telehealth and Telecare Aware: <http://telecareaware.com/>

Yorkshire and Humber Health Innovation and Education Cluster (HIEC) Telehealth Toolkit: <http://yhhiec.org.uk/telehealthtoolkit/>

Yorkshire and Humber Health Innovation and Education Cluster (HIEC) Telemonitoring workbook: [http://yhhiec.org.uk/wp-content/uploads/2011/10/11070604\\_Tele\\_Moni\\_Workbk.pdf](http://yhhiec.org.uk/wp-content/uploads/2011/10/11070604_Tele_Moni_Workbk.pdf)

Yorkshire and Humber Health Innovation and Education Cluster (HIEC) Teleconsultation workbook: [http://yhhiec.org.uk/wp-content/uploads/2011/10/11092020\\_tele\\_consultation\\_workbk.pdf](http://yhhiec.org.uk/wp-content/uploads/2011/10/11092020_tele_consultation_workbk.pdf)

## INFORMATION GOVERNANCE RESOURCES

IG information and support materials: <http://www.england.nhs.uk/ourwork/tsd/ig/>

IG support materials on confidentiality, information security, codes of practice, and the IG Toolkit: <http://systems.hscic.gov.uk/infogov>

## REFERENCES AND FURTHER READING



### MEASURING IMPACT

The references and further reading section of the toolkit is structured around the following areas, with subtopics within each one:

#### SOURCES OF METRICS:

NHS Outcomes Framework <https://www.gov.uk/government/publications/nhs-outcomes-framework-2014-to-2015>

Adult Social Care Outcomes Framework <https://www.gov.uk/government/publications/adult-social-care-outcomes-framework-2014-to-2015>

Public Health Outcomes Framework  
<http://www.phoutcomes.info/>

Quality and Outcomes Framework <http://www.hscic.gov.uk/qof>

Better Care Fund Metrics <http://www.england.nhs.uk/ourwork/part-rel/transformation-fund/bcf-plan/>

STRATEGIC  
PLANNING

PROCUREMENT

IMPLEMENTING  
TECS

MEASURING IMPACT

IMPROVEMENT

## REFERENCES AND FURTHER READING



### IMPROVEMENT

The references and further reading section of the toolkit is structured around the following 5 areas, with subtopics within each one:

#### CHANGE MANAGEMENT

NHS Change Model

<http://www.changemodel.nhs.uk/pg/dashboard>

#### LEARNING FROM INTERNATIONAL EXAMPLES:

The Health Foundation (2014) What can the UK learn from Healthcare innovation in India? <http://www.health.org.uk/publications/what-can-the-uk-learn-from-healthcare-innovation-in-india/>

Cochrane Library – Special Collection on Telemedicine: <http://www.thecochranelibrary.com/details/collection/806797/Telemedicine.html>

EU's Medetel Library: EU perspective on telehealth and telecare evidence [http://www.medetel.eu/index.php?rub=knowledge\\_resources&page=info](http://www.medetel.eu/index.php?rub=knowledge_resources&page=info)

American Telemedicine Association: Headquartered in Washington DC and promotes telemedicine developments <http://www.americantelemed.org/docs/default-source/policy/examples-of-research-outcomes---telemedicine's-impact-on-healthcare-cost-and-quality.pdf>

#### RESOURCES FOR SUPPLIERS:

Innovation Connect: Support and advice for emerging healthcare innovations <http://www.england.nhs.uk/ourwork/innovation/innovation-connect/>

Innovation Exchange: Interactive resource for anyone interested in innovation in healthcare to share ideas and network <https://nhs-ihw-colab.induct.no>

European Connected Health Alliance: Organisation for the development of Connected Health markets across Europe <http://www.echalliance.com/>

## ABBREVIATIONS GLOSSARY

<b>AHSN</b>	Academic Health Science Network
<b>ADHD</b>	Attention Deficit Hyperactivity Disorder
<b>CCGs</b>	Clinical Commissioning Groups
<b>CLAHRC</b>	Collaboration for Leadership in Applied Health Research and Care
<b>CHF</b>	Chronic Heart Failure
<b>COPD</b>	Chronic Obstructive Pulmonary Disease
<b>CSU</b>	Commissioning Support Unit
<b>IDCF</b>	Integrated Digital Care Fund
<b>IDCR</b>	Integrated Digital Care Record
<b>LTC</b>	Long term condition
<b>NIB</b>	National Information Board
<b>TECS</b>	Technology Enabled Care Services
<b>TELECARE</b>	The use of technology to enable people to live independently in their own homes where they otherwise might not be able to do so. Much of this technology is to do with monitoring the person's daily life, such as temperature detectors, flood detectors, gadgets that identify that a gas hob has been turned on but not lit, and falls detectors. Increasingly, many of these sensors are mobile, meaning that they can be used outside of the home too. Sensors are linked to call centres and when an alert is sent, this triggers a response from the call centre or emergency services.
<b>TELECOACHING</b>	Provides support and guidance to enable patients to manage their own conditions. It covers factors such as lifestyle change, medication management and access to appropriate services. It can be delivered through a variety of communications channels and methods, such as mobile phone apps, telehealth home monitoring equipment or structured phone calls with a trained member of staff.

## ABBREVIATIONS GLOSSARY

### TELEHEALTH

Telehealth directly involves clinicians as an integral part of the service. In contrast to telecare, it is usually not linked to an emergency response service, but is used more for the regular monitoring of vital signs so that unusual activity can be detected before the situation becomes critical. Telehealth is an important tool for prevention and anticipatory care. Examples include electronic sensors or equipment such as glucometers for diabetics, blood pressure cuffs, weighing scales and pulse oxymeters that stream data back to a nurse monitoring centre via a hub unit which could be a smartphone, home computer or tablet device. These technologies monitor vital health signs remotely in your own home or while on the move and readings are automatically transmitted to an appropriately trained person who can make decisions about potential interventions in real time, without the patient needing to attend a clinic. Patients normally take their readings on a daily basis and may even answer tailored questions concerning their mood and general wellbeing. It is important to note that this is not an emergency response service.

### TELEMEDICINE & TELECONSULTATION

The use of video conferencing facilities (or high quality webcams) to enable remote consultations between patients and healthcare professionals, as well as peer to peer consultations between professionals. This could also be used for wound or pressure sore monitoring, or stroke support. Some therapy services (such as speech and language services) are also looking to use it to deliver services direct into a patient's home (sometimes on a group basis).

## ACKNOWLEDGEMENTS AND CONTACTS

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**North West Coast Academic Health Science Network**  
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