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Guidelines for selection of future patients for COPD
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Abstract

This document outlines guidelines for the selection of patients who are most likely to benefit from U4H services, including those patients who appear unlikely to benefit.

Key Word List

COPD, Benefit, Telemonitoring

Executive Summary

This document identifies the patients who appear most likely to benefit from U4H services for Chronic Obstructive Pulmonary Disease (COPD), and those who appear not to benefit.

Patients were recruited to the study following a hospitalisation for an exacerbation of their COPD according to the Global Strategy for Diagnosis (GOLD) COPD standard. Originally, the scientific protocol required patients to receive their telehealth on discharge from hospital. However, approaching patients and gaining their consent to receive telehealth whilst they were experiencing an acute exacerbation resulted in a very slow recruitment rate in many deployment sites. The protocol was therefore revised to enable sites to recruit patients up to seven days post discharge from hospital as well. The telehealth intervention included patients were able to take and upload their vital sign measurements, answer symptom management questions, receive a teleconsultation (by video and/or phone), and receive health coaching messages, all dependent on their health status post discharge from hospital.

From our experience to-date, identifying particular patient characteristics with enough reliability to deny or offer a potentially very effective service remains imprecise. There is more certainty about identifying what healthcare and IT infrastructure is needed to deploy telehealth at scale in COPD.

We recommend the following for the most likely effective and cost-effective service:

- Telehealth should be recommended for patients following an acute exacerbation of COPD treated either in community or hospital settings.
- If patients are identified in hospital, recruitment should happen within the patient's own environment post discharge.
- Use a flexible monitoring system allowing real time data uploads.
- Use as simple as possible technology (not reliant on 4G or video streaming) for both patients and clinicians.
- The first level of alerts can be filtered safely by generic staff and referred up to a healthcare professional once technical issues are resolved (lower cost and best use of clinical time).
- Start with a pragmatic one month inclusion into a patient's care plan; unless the telehealth system is used regularly, it should be removed and redeployed.
- The patient should not continue to take and upload their vital signs and answer symptom management questions once their health status has become stable for an agreed period of time (up to three months).
- A number of elements need to be integrated for effective and efficient service delivery:
  - An understanding of local ICT infrastructure, including bandwidth and signal strength;
  - Appropriate governance support;
  - A clinical lead (e.g. hospital specialist or primary care physician with specialist interest) who decides clinical priorities, rather than being influenced by telehealth vendor's recommendations relating to the technology;
  - Organisational informatics / ICT team engagement;

- An appropriate healthcare professional to act as telehealth lead (e.g. nurse, therapist etc) for service design and day-to-day operations.

Change History

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Version Changes

0.0 Table of Contents
0.1 First draft
0.2 Conclusions added
0.3 Inclusion of Background and Methodology
0.4 Minor revisions to Executive Summary
1.0 Version for issue

Outstanding Issues

Table of Contents

1. Introduction

1.1 Purpose of this document

This document sets out the patients who appear most likely to benefit from U4H services, and those who appear not to benefit.

1.2 Glossary

COPD	Chronic Obstructive Pulmonary Disease
HCP	Healthcare Professionals
TM	Telemonitoring
U4H	United4Health

2. Background and methodology

2.1 Background

Deployment sites are seeing increases in the number of people living longer with chronic conditions, and are looking at ways to shift the balance of care towards the home and out-of-hospital environments through investing in 'upstream' interventions which focus on self-management at the patient level.

In addition, the current context of economic pressures is requiring care systems to achieve better value from their resources while improving the quality and reducing use of health services, particularly for those living with long term conditions, through the use of technology. Telehealth is seen as one of the key enablers for the transformation of healthcare delivery.

COPD has trackable vital signs that are indicative of a patient having an exacerbation, as they experience a reduction in their oxygen saturation level, and increase in temperature. Such 'trackable' physiological measurements can be remotely monitored using telehealth, which often includes a number of health and wellbeing related symptom management questions.

Patients were recruited to the study following a hospitalisation for an exacerbation of their COPD according to the Global Strategy for Diagnosis (GOLD) management and prevention of COPD standard. Originally, the scientific protocol required patients to receive their telehealth on discharge from hospital. However, approaching patients and gaining their consent to receive telehealth whilst they were experiencing an acute exacerbation resulted in a very slow recruitment rate in many deployment sites. The protocol was revised to enable sites to recruit patients up to seven days post discharge from hospital.

2.2 Methodology

U4H has had strong emphasis on organisational assessment, including the views and experiences of healthcare professionals, patients and carers.

The overall methodology of the organisational assessment is based on MAST (Kidholm et al. 2012) and follows the guidelines for analysis and reporting of results developed under the Renewing Health project to support the application of MAST (Kidholm et al. 2013). Specifically, evaluation of organisational impact corresponds to Domain 6 of MAST in terms of changes in three aspects: Structure, Process and Culture, while Domain 4 focuses on the Patient Perception.

For U4H, a common template based on open-ended questions for these domains was provided to all deployment sites, along with detailed background information and guidance. Data collection was carried out in each deployment site and subsequently reported back to the central evaluation team.

Sections 3 and 4 of this report draw on particular themes that have an impact on selection of future patients for COPD telemonitoring, using information from the organisational assessment and patient perception questions from the deployment sites. This information has been derived from a range of activities undertaken in the sites including focus groups with patients and workforce members, individual

interviews conducted by an external university researcher either face-to-face, by telephone or video conference, and semi-structured interviews carried out by a project team or telehealth service delivery team member, again either face-to-face or by phone or video conference.

3. Qualitative findings

3.1 Staff Adoption

The views of staff involved in the U4H COPD deployment sites can be used to identify some of the influences that they have on the future selection and uptake of patients being offered telehealth services. It was discovered that inconsistent community / home-visiting services across different areas of the same health provider had an influence on the perception of the benefits and barriers to telehealth services.

Some healthcare professionals (HCPs) who were not familiar with managing less severely ill patients direct from hospital admission expressed a concern that telehealth took up more HCP time to monitor patients. They believed this was increasing the workload by adding an additional screening layer of patients who would not usually be followed up; but other, more experienced, HCPs discovered that they were spending less time monitoring and treating patients on telehealth than those who were not managed this way. These HCPs felt that they managed their caseloads better than previously by prioritising patients. Some HCPs found that time constraints during their working week meant that patients occasionally did not get full instruction in technology use, leading to reduced engagement / time management in an already stretched service, and felt that having a dedicated technical support service to manage this would have been more cost effective. In some deployment sites, it was only the doctor who decided which patients were approached for telehealth post discharge, but HCPs felt that uptake by patients could be increased if all HCPs could approach patients.

Increased confidence of HCPs in the telehealth systems used had a direct impact on increased confidence of the patient to use technology. If the HCP's overall technical skills were reduced, it resulted in poor confidence levels to use technology to monitor patients. HCP engagement was deemed important for patient engagement.

Some healthcare providers explained that using telehealth had allowed them to develop their services by establishing virtual treatment teams, but became frustrated when initiation of a telehealth service was delayed. They developed additional capabilities resulting in a sense of increased professionalism. Using telehealth also changed the HCP expectations of the patients' ability to self-manage; as a result, they would prefer to have further development of online based care support services. The HCPs would recommend that telehealth guidelines be developed and adopted to ensure standards of care are maintained.

At times of alerts, some HCPs expressed that they found it difficult to access GPs via telephone for advice, but others had discovered that the telehealth service actually improved information flow from HCP to HCP as new communication pathways were developed, which in turn increased productivity. It did not appear to improve collaboration where integrated working patterns were already established. Improved data exchange between secondary and community / home-visiting HCPs, and improved cooperation saved significant time on care. During discussions, it was expressed that HCPs were quicker to lose their engagement than patients when technology failed, and were concerned that any negative experience encounter could impact negatively on the patient/clinician relationship in future.

Generally, HCPs thought the technology was easy to use, and that easy to install equipment was available within a short time period. The HCPs almost fully agreed that the total monitoring period of 12 months was too long to continue most patients' engagement, and that COPD post discharge telehealth should be time limited to no more than a three month period, particularly teleconsultations, taking of vital signs, and responding to symptom management questions. The situation for health coaching messaging was less clear, as not all COPD deployment sites included this aspect of the intervention into their delivery models for a 12 month period.

In Wales, there was a perceived increased dependency of some patients on easy access to services, but this was not found in other deployment sites' focus groups. Instead they identified improved quality of life for patients, increased patient empowerment and self-management, a more person-centred service, patients having a better understanding of their condition, and improved assessment of exacerbation risk, as results across all other deployment sites. HCPs also stated that the telehealth service reduced the need for GP visits or re-admission to hospital, and supported discharge from hospital.

The HCPs did identify a number of process barriers to large scale adoption of COPD telehealth:

- ICT Infrastructure, bandwidth and signal strength is poor in some areas in most deployment sites, and needs to be improved significantly.
- Telehealth needs to be integrated into current organisational structures and mainstream services.
- There is a need for simple data transmission protocols.
- Information management could be optimised by improving access to e-health records for all HCPs.
- The stand-alone nature of software reduced data sharing with GP clinical systems; the ability to share data must be increased.
- Less restrictive referral pathways are needed.
- Technical support must be available, and needs to be integrated into the health organisation's ICT support systems and processes, rather than be stand alone.
- Clinicians need to have remote access to the "back-end" data web portal.
- There is a need for early investment in staff training prior to start of monitoring service.
- HCPs should be directly involved in the development of the software used, to encourage their engagement.
- Technology needs to be 'as simple as possible' to assist in increasing patients' self-management.

Appendices A - E and Annex 1 provide details of the feedback from staff.

3.2 Views of patients and relatives

Who are the most suitable patients and who will benefit most from telehealth continues to remain a significant challenge, and varies from patient to patient. Most patients interviewed drew attention to a number of benefits and concerns, some of which appear to back-up the HCPs' opinions.

Patients found that they received a more prompt care delivery response and direct intervention as a result of monitoring. It improved their quality of life, and they had better symptom management and psychological support; there was a perception that they were being monitored daily, which gave reassurance. They thought that telemonitoring helped develop a more person-centred service; it supported discharge from hospital; encouraged a better understanding of COPD with earlier exacerbation identification; gave a feeling of being less lonely and isolated; they gained more control over their clinical care through the education that telemonitoring and the tele-coaching offered. Patients with good oxygen saturation values for that day felt empowered with greater reassurance; this increased confidence to engage in more activities. Patients did not feel that telemonitoring created privacy problems.

Patients on COPD telehealth felt that they were visited fewer times by their GP or community / home-visiting nurse, and were admitted to hospital less, but received an enhanced health service; they saw this as an opportunity to remove some pressures from the current community / home-visiting services. Patients who were in employment felt that by using telehealth they did not need disruptive clinical visits to their GP practice or hospital clinic.

Significant enablers for telehealth use were the presence of supportive family members, and having a supportive HCP integrating telemonitoring into their care plan. This helped them gain more psychological and educational benefits than those who were left in isolation. HCP engagement was seen as vitally important for patient engagement.

Patients felt that the cost of any telehealth service should be kept to a minimum to encourage patient engagement. It should also be offered to all patients who have COPD exacerbation independent of the place of treatment, as the U4H project only offered it to patients who had been admitted to hospital. Patients do not feel that telemonitoring can be a substitute for routine care, but that there was a need for 7-day reactive service rather than the usual 5-day (i.e. Monday-Friday only) service.

Generally the technology was well received by patients, and they reported it easy to use. Any technical problems were resolved at the earliest opportunity, and technical support was thought to be an important factor in maintaining engagement. Some patients suggested that there should be information campaigns about telehealth for patients and care givers. Patients also felt that increased confidence of HCPs in the system resulted in increased confidence of patient to use the technology. When HCP overall technical skills were low, it led to poor confidence levels.

4. Guidance on selection of patients for future deployment of telehealth

4.1 Selection of patients from a clinical perspective

Most deployment sites found a higher non-participant rate than expected, but there were a small number of enablers identified for the clinical selection of patients:

- Patients needed to have HCP telehealth engagement and confidence.
- HCPs who know the patient should be encouraged to approach patients about the introduction of telehealth into their care plan.
- Improved uptake of service when initiated in the community / home settings.
- Those who completed pulmonary rehabilitation engage very well with telehealth[1,2].
- Severely ill patients / end of life are not appropriate for telemonitoring.
- Patients who do not have home support need to have cognitive and physical stability.
- Patients less disabled by their COPD and those receiving non-mobile telehealth devices did not want to commit to staying at home at specific times, so there needs to be flexibility of monitoring for these patients.
- There is less cost effectiveness in implementing telehealth for patients who are not extensive healthcare users[1].
- Patients who are stratified as at high risk of having an exacerbation resulting in emergency admission or readmission.

4.2 Selection of patients from a patient characteristics / profile perspective

A number of patient characteristics were identified by the U4H COPD study to aid patient selection:

- A positive attitude to telehealth from family members who often assisted in technology use when patients had difficulty.
- Age was thought to be a barrier to adoption by both patients and HCPs, but did not appear to be a determining factor during the COPD study. The ability to use technology was not confined to the young, any gender, ethnicity or social background. Older people did need additional support if they were unfamiliar with the technology.
- Younger participants were more interested in data management and technical capabilities.

[1] Lewis K, Annandale J, Warm D, Rees S, Blyth H, Hurlin C, Yasir S, and Lewis L (2010). Does home telemonitoring after pulmonary rehabilitation reduce healthcare use in COPD? A pilot randomised trial. Journal of Chronic Obstructive Pulmonary Disease 7:44-50.

[2] Lewis K, Annandale J, Warm D, Hurlin C, Lewis M, and Lewis L (2010). Does home telemonitoring further affect quality of life for patients with COPD who have had pulmonary rehabilitation? A pilot randomised trial. Journal of Telemedicine and Telecare 16: 253–259.

- Any patient sensory impairment needs to be considered when technology is recommended / developed.
- Patients with a reduced level of home support, or those who live alone without support, had lower telehealth engagement. There is a need to arrange additional support to help them manage.
- Patient engagement with telehealth increased with face-to-face contact on enrolment.
- General motivation to self-manage.
- Patients in more rural areas or those further away from resources.
- Patients who were working or did not want disruptive clinical visits.
- Ability to understand instructions.
- Willingness to adapt to new experiences.

During the study, it was found that there was increased anxiety over using technology in non-participants. Further research is needed to better understand patient choices, autonomy and health motivations.

4.3 Selection of patients from a telehealth solution and IT infrastructure / technical perspective

Some patient characteristics were identified by the U4H project that could aid patient selection from a telehealth / ICT infrastructure / technical perspective:

- Patients or family members / carers need to be willing and able to use technology.
- The patient needs a HCP that engages with telehealth.
- Advantageous to have a patient who already uses basic modern technology.
- The technology needs to be flexible so that it can be individualised to the patient requirements.
- Ability to use technology including peripheral devices or be supported to do so.
- Patients need to have access to timely technical support, as any ongoing technical problems (e.g. infrastructure / sound / display / Bluetooth connectivity / battery life) reduced patient engagement.
- Patients need to have a good technical infrastructure available. Connectivity limitations were a barrier to adoption and engagement.
- There needs to be a suitable place for equipment storage at home.
- Availability of easy to install equipment deployed within a short time period.

5. Conclusions

From our experience to date, identifying particularly patient characteristics with enough reliability to deny or offer a potentially very effective service remains too imprecise.

We have more certainty about informing what healthcare and ICT infrastructure is needed to deploy telehealth at scale in COPD.

We recommend the following for the most likely effective and cost-effective service:

- Telehealth should be recommended for patients following an acute exacerbation of COPD treated either in the community / home or hospital settings.
- If patients are identified in hospital, the offer of the service should take place within the patient's own environment post discharge.
- Use a flexible monitoring system allowing real time data uploads in order for appropriate review and response mechanisms to be incorporated into the relevant clinicians' workflow.
- The technology should be as simple as possible (not reliant on 4G or video streaming) for both patients and clinicians.
- The first level of alerts can be filtered safely by generic staff, and referred up to HCP once technical issues are resolved (lower cost and best use of clinical time).
- Start with a pragmatic one month trial; unless the telehealth system is used regularly, it should be removed and redeployed.
- The system should be removed after the patient's health status has stabilised for a period of time (agreed by patient and those monitoring) and redeployed.
- A number of elements are needed to be integrated for effective and efficient service delivery:
  - An understanding of local IT infrastructure, bandwidth and signal strength;
  - Appropriate governance support;
  - A clinical lead (likely to be a hospital specialist or primary care physician with specialist interest) to decide clinical priorities rather than being influenced by telehealth vendor's recommendations or priorities;
  - Organisational informatics/IT team engagement.
- An appropriate HCP to act as telehealth lead (e.g. nurse, therapist, etc.) for service design and day-to-day operations.

Appendix A: Berlin - Staff views

A.1 Summary based on focus groups or group interviews with involved professionals

How do different staff members describe their experience regarding the provision of the new service?

The pilot for diabetes and COPD in Berlin is realised by:

- Doctors:
  - For the doctors, it is important to be directly involved in the development. The critical fact from previous experience is that most projects were controlled by industry. If the settings of TM are effective, from the perspective of doctors TM can be a supply innovation. But it should not be any additionally financial burden to the doctors.
  - Most important is the implementation of telemonitoring as a practical care approach in care quality improvement (primary health care). In this context, it is the intention to develop a minimised cost model for simplified roll-out.
- Nursing:
  - The relief and support of ambulatory nursing care is important, distanced from purely administrative work. At least at the focus is avoiding of hospital admissions, the optimisation of release management from the hospital in the outpatient care with the help of a effective network of providers, and the minimisation of supply risks in practice.

Would they like to continue providing it?

Without exception, all the staff of Pflegewerk (physicians, nurses and social workers) and the external partners would continue to participate. These four important conditions have been identified:

1. Funding should not deteriorate.
2. There should be no staff reductions caused by the automation of technical processes.
3. Technical problems should be resolved, possibly by a new generation of vital sensors.
4. The software ergonomics have to be revised again on the basis of internal protocol.

Where they satisfied or dissatisfied overall with the new service? To what extent?

There were different answers:

1	ePatient records	• Positive experiences with remote access to ePortal; • The alarm functions could be used by the external medical practices; resulting was optimised data access for doctors at any time; • Positive is the improved assessment of risks and optimisation of medical progress monitoring; • Facilitation of the documentation of process parameters (vital signs) for care; • In some cases improved access on the part of the clinics to the most important patient data in the context of release management; but this could be better
2	Some critical points and further improvements	• Access to the project is currently only possible remotely; the proprietary system architecture has not yet been overcome. • The transmission protocols must be simplified, so that a new communication design can be created.
3	Communication and cooperation	• The formation of multi-professional teams on the basis of virtual communication has for the first time gained practical experience. • Significant time for care was saved through improved cooperation. • Through these additional capabilities, the care sector gains an important increase in professionalism. • With the alarm function, professionals could coordinate faster and intervene directly and promptly in the care delivery processes.

Which of the staff's expectations were met, and which were not?

Expectations that were met:

- Implementation of telemonitoring as practical care approach in the care quality improvement (primary healthcare).
- Relief and support of ambulatory nursing care, distanced from purely administrative work.
- Avoiding hospital admissions.
- Minimisation of supply risks in practice.
- Optimisation of release management from the hospital in the outpatient care.
- Implementation of a smart, technological model based on your own request profile.
- Ensuring the central, autonomous data storage.
- Creation of decentralised access options for implementation.

Expectations that were not met yet:

- Certain technical aspects must be improved. For example, absent is a vital sensor with Bluetooth capabilities for blood gas analysis. In addition, the blood pressure monitors are very sensitive and not suitable for elderly patients. The trolleys are also not secure against tipping. But these problems can be overcome with the next technological generation.
- The realisation of a complete network of providers was not yet possible.
- The nationwide roll-out regarding the implementation as a population-based model (public health) in the regional supply was not yet possible.

What was the evaluation of the usability of the telemonitoring application(s)?

Telemonitoring can improve the quality of life of the average diabetic or COPD patient. Furthermore, economic assessment can realise cost minimisation. The economic analyses performed suggest that telemonitoring can result in a lower average total cost per patient. This is driven primarily by two aspects:

- Firstly, nurses were spending less time monitoring and treating patients in the intervention group compared to patients in the control group.
- Secondly, patients in the intervention group visited their GP or specialist fewer times during the 12 months of the trial.

Were there any technical difficulties described by the staff which may have affected the quality of care delivered? How were these resolved?

There were no difficulties.

What were the experiences regarding collaboration between different professional groups (internally) in relation to the service?

The results show that by telemonitoring, in particular at the process level, through a central electronic medical record, optimised information management is created which leads to a better collaboration and effective work tasks (task shift):

- Team work: Faster access to necessary patient data and thus the establishment of virtual treatment teams (multi-professional teams).
- Risk management: Use of technology-based alarm management planning or even avoiding costly assignments and improve collaboration.
- Process innovation: Experiences of the changed requirement profile for an online-based information management system that optimises the interoperability of information exchange.
- Alternative forms of communication: Preparation of a new generation of online-based care models with video conference through the telemonitoring project Renewing Health.
- Time: Optimisation of the supply processes regarding acceleration, avoiding false operations, higher information quality, reduction of travel times.
- Funding: Collection of supply and performance data for the improved calculation of supply and thus the foundation for funding negotiations.

What were the experiences regarding collaboration with other institutions (externally) in relation to the service?

The cooperation with the hospitals has improved. By the regulatory change in accordance with § 39 SGB V, the clinics have to realise supply management for the patient release. The central point is the communication between the responsible staff in the hospital and the ambulant sector (doctors, nursing homes). The improved data exchange through the central health record and the support from telemonitoring has increased cooperation with the clinic significantly.

What were the experiences regarding the relation with the patient while providing the new service?

Regarding patient perspectives, it seems that patients with diabetes or COPD have mild beliefs about telemonitoring. They mildly agree that telemonitoring enhanced their regular healthcare and increased accessibility to healthcare services. They mildly disagree that the kit created problems with privacy or caused discomfort and that they had concerns about the personnel associated with their care. However, they disagree that telemonitoring can act as a substitute to standard care. All the above mild positive beliefs about the value of telemonitoring result in an indifference of diabetic and COPD patients towards it, neither satisfaction nor dissatisfaction. Socio-demographic characteristics do not seem to affect their views about acceptability and satisfaction with the kit and telemonitoring.

How do the involved professionals describe the added value and the drawbacks of the new service?

1. The investment and operational costs could be minimised by the synergy effect with measurement of groups to €13 per patient per month. The current market price of other providers of telemonitoring is between €65 and €130. Added to this, so far no technology provider in Germany can bind a set of vital sensors through a Smartphone as a gateway which restructures the data of a group of patients which can be administratively managed.
2. By simplifying the technology, the proportion of self-monitoring patients can be increased and can therefore help relieve caring staff.
3. Travel time of the doctors and nurses in the intervention group could be minimised by the continuous monitoring and transmission of vital data and immediate use of specialised nursing, or frequent doctor's visits could be replaced by this transmission of vital data. But this being generated in the care industry is not intended to substitute basic care and term care as set out in context of the SGB XI long term care insurance. Therefore, no "thinning" or rationing of care can take place.
4. The realisation of a "communication model of the future" divided into three levels:
   a) Self monitoring:
      Communication to the patient with ePortal, giving the patient necessary feedback (values, malfunctions).
   b) Measurements of a patient living alone by the nurse (or doctor in individual cases) during the home visit:
      Communication of the nurse with the ePortal, which gives her professional special medical confirmations (value changes, malfunction, etc.).
   c) Measurements of a group of patients in assisted living by the nurse (or doctor in an individual case) in the context of supply management:
      Communication of nurse with the ePortal, which gives professional special medical feedback (value changes, malfunction, etc.) on patient population (disease management programme).

Do involved professionals suggest any actions to overcome existing barriers to and to support the implementation of the new service?

The following measures were proposed:

1. Improvement of the new eHealth Act of 01.07.2015 with a fixed timetable for the financing of telemonitoring in the context of health (doctors).

2. Implementation of the guidelines for the delegation of nursing services in the context of telemonitoring by the physician to the responsible caregivers (nursing).
3. Legal basis for an interoperable interface to overcome proprietary systems (clinic, doctor's surgery, nursing).
4. Information campaigns for caregivers to use these services.

A.2 Applied methodology

What methodology was used to gather the information and to elaborate the report?

The data was collected through interviews with individual employees (doctors, nurses) and a small focus group.

Which professionals/staff were interviewed or involved in some other way in the assessment of the organisational impact? Please, describe professional roles, level of involvement in the study and provide numbers.

A total of seven nurses and six doctors were involved in the assessment at the operational level of the Company. This includes other doctors from external practices and employees of hospitals.

In addition to the project management, two employees for technical support and data collection were also hired by the Company.

	Number involved?	Their role?
Hospital MDs (by clinical specialty)	1	Cooperation for the discharge management according to § 39 SGB V and participation in telemonitoring case conference (“telemonitorisches Konsil”).
Hospital nurses	2	Cooperation for the discharge management according to § 39 SGB V and participation in reconciliation of patients in ambulatory care, including the regulation of nursing home care in accordance with § 37 SGB V.
Municipality MDs	1	These are in Berlin resident doctors approved by the physicians' association. these are part of the power supply network of Pflegewerk either within the health care centre Mediplus (a part of Pflegewerk) according to § 95 SGB V or in the practical network in accordance with § 87b SGB V.
Municipality nurses	-	
GPs	4	In Berlin, there are two supply networks with a focus on primary care and to special contracts for the family doctor-centred care accordance with § 73b SGB V.
GP practice nurses	-	

	Number involved?	Their role?
Others: nurses and nursing assistants.	7	They are directly employed by Pflegewerk and support the patient for telemonitoring and care.

All of these persons were interviewed on the basis of given guidelines.

Appendix B: Galicia - Staff views

B.1 Summary based on focus groups or group interviews with involved professionals

How do different staff members describe their experience regarding the provision of the new service?

There is a general controversy. While some physicians believe it works really well, some other believe that even when patients can feel it is a good tool, really the programme does not help to reduce readmissions.

Would they like to continue providing it?

Absolutely yes, at this moment. However, it will have to be reconsidered after a cost-effectiveness analysis has been done.

Where they satisfied or dissatisfied overall with the new service? To what extent?

Mostly clinicians were satisfied after they found how old people were able to manage quite well with the technology.

What was the evaluation of the usability of the telemonitoring application(s)?

It was easy to use for the patients, and also helped the clinicians when patients were seen at outpatient clinics to better understand their diseases.

Were there any technical difficulties described by the staff which may have affected the quality of care delivered? How were these resolved?

During the busiest days, clinicians had more problems to explain the programme to patients.

What were the experiences regarding collaboration between different professional groups (internally) in relation to the service?

Mostly clinicians had to collaborate with central or municipally nurses. The information flow and collaboration was very productive.

What were the experiences regarding collaboration with other institutions (externally) in relation to the service?

We have not had collaboration with other institutions to develop the service.

What were the experiences regarding the relation with the patient while providing the new service?

Overall was really good. Patients used to understand the telemonitoring and were able to adopt this new technology, sometimes with the help of their family members.

How do the involved professionals describe the added value and the drawbacks of the new service?

Although it added some more work for the attending physicians, clinicians feel that this data could help to follow the patient at the outpatient clinic. Clinicians also expect cost-effectiveness analysis of the tool.

B.2 Applied methodology

What methodology was used to gather the information and to elaborate the report?

Review documentation, individual interviews.

Which professionals/staff were interviewed or involved in some other way in the assessment of the organisational impact?

Attending physicians, clinical coordinators, programme nurses.

Appendix C: North Norway - Staff views

C.1 Summary based on focus groups or group interviews with involved professionals

How do different staff members describe their experience regarding the provision of the new service?

See questions further down.

Would they like to continue providing it?

Yes. The system represents a possibility to communicate with patients after they have left the hospital. The health carers can use the system to follow up patients and guidance while the patients are in their homes. For example, the health carers will be able to guide the patients on how to use medical equipment, as some patients tend to forget how to use the equipment.

The patients will feel safer when they know that they can stay in contact with the staff at the hospital after they have left hospital, e.g. getting information about things they like to know more about, or things they have been learning about but have forgotten, as some patients tend to wait some days before they start with a new practice after leaving the hospital.

However, it is important to define a specific period of time for when the patients are to use the system. There is a danger of patients are getting dependent of having access to the services.

Where they satisfied or dissatisfied overall with the new service? To what extent?

The health carers were satisfied with services. The carers were especially satisfied with possibility of communicating and stay in contact with patients via the tablet after they had left the hospital. The carers had met the patients f-2-f at the hospital, and on basis of this knowledge, in combination with their general knowledge, they were able to register relevant aspects of the status of the patient.

Which of the staff's expectations were met, and which were not?

The carers expected to use the services on a regular basis. However, the number of patients included in the project has been lower than expected, due to the inclusion criteria. The carers expected to gain knowledge regarding if and how the system would affect readmission to the hospital; however, the number of patients was too low to get reliable results.

The tablet is small, with small letters. Before the project started, the carers thought that patients might have problems with using the small, soft keys; it is typical for this group of patients that their hands are shaking. But the project revealed that the patients were able to use the soft keyboard. It is more challenging for patients with impaired eye sight.

What was the evaluation of the usability of the telemonitoring application(s)?

It is a system that is easy to use, both for patients and staff. The instructions and guidance from NST functioned very well, and the carers were able to guide the patients via telephone when they encountered problems.

Were there any technical difficulties described by the staff which may have affected the quality of care delivered? How were these resolved?

There were some technical problems, mainly to due to connection problems, resulting in bad sound and vision.

When the staff encountered these kinds of technical problems, they would use phones to communicate with and guide the patients. The carers could also use the phone to guide the patients on how to use the tablet.

What were the experiences regarding collaboration between different professional groups (internally) in relation to the service?

The health carers have had contact with several actors at the University Hospital of Northern Norway (UNN).

NST has been offering guidance and technical support during the whole project period. NST have been very helpful during the project period, and been flexible and willing to help us whenever needed.

BMH have been handling the tablets, including camera, software etc., and pulse oximeter. They would also take care of the tablets after the patients had finished their test period, deleted the patient's information and made them ready to be handed out to new patients. The collaboration with BMH has functioned very well.

The day-to-day services were provided by the two nurses. The doctors decided which patients were to get access to the services. During the project period, another doctor took over the medical responsibility for the project. The doctors could have been more involved in the project, for example answering questions regarding the status of patients and medicine.

What were the experiences regarding collaboration with other institutions (externally) in relation to the service?

The nurses have been in contact with COPD contact in the municipality, although not as often as planned. The patients were told that they could contact the COPD contacts.

The nurses have been in contact with the GPs. The nurses communicated with GPs regarding the follow up of the patients and use of medicine. Sometimes it is difficult to contact the GPs via phone, but there are also examples of GPs calling the nurses later. However, the carers think it would be easier to talk to a physician on the ward, for example whenever the nurses notice that patients do not fully understood information regarding medicine.

What were the experiences regarding the relation with the patient while providing the new service?

The nurses knew the patients before they started to communicate via the tablet. They had met the patients face-to-face on the ward when they offered them the possibility to join the project. The use of the tablet for communication was adequate

to obtain relevant information regarding the status of the patient, as well guiding the patient. Sometimes the nurses would tell the patient to contact their GP based on this information.

How do the involved professionals describe the added value and the drawbacks of the new service?

This service may have several added values:

- The system may reduce patient's readmission to the hospital.
- The patient can start earlier with medication when they get support via tablet, as they often seem to hesitate a bit after leaving the hospital, which also means that they tend to forget relevant information.
- Reduce the need for travelling when the patients are not feeling well.

However, the number of patients participating in the project was low, so it is difficult to be specific regarding the benefits, especially readmissions.

The drawback is that the patients may get “dependent” of having access to the services.

Do involved professionals suggest any actions to overcome existing barriers to and to support the implementation of the new service?

- It is a service that should be offered to people in need of the services; the inclusion criteria in the project were too narrow.
- The ward should be included in the process of making decisions regarding who should have access to the service.
- The objective of the service must be clearly stated.
- The service must be integrated into a well-defined organisational framework, in a manner that involves the whole ward, and in a flexible manner.
- The service should be time limited, and this should be communicated to the patient from the very start.

C.2 Applied methodology

What methodology was used to gather the information and to elaborate the report?

Individual interview, focus group interview.

Which professionals / staff were interviewed or involved in some other way in the assessment of the organisational impact?

Two nurses providing the service to the patients.

One nurse: project manager and head nurse at the hospital, providing services to the patients.

Appendix D: Scotland - Staff views

Summary based on focus groups or group interviews with involved professionals.

How do different staff members describe their experience regarding the provision of the new service?

Pilot 1: Ayrshire & Arran

In Ayrshire & Arran, all staff, including clinicians and managers, had an overall positive attitude to home health monitoring, although many did describe apprehension and trepidation at the outset of the project, but then went on to describe positive experiences. Clinicians anticipated additional work and time would be needed on top of their existing workload.

> *"Technology will mean we are able to assess all aspects of care, medication and priorities accordingly."*
>
> *"Expectation that this project could provide some answers and guidance and evidence to convince others of the role of home health monitoring for COPD."*

All staff raised concerns regarding the restrictive parameters set by the project, identifying concerns regarding project deliverables and redesign, but confident and positive relating to patient benefits and outcomes

> *"Trepidation not realising involvement required at the outset of the project."*

Staff had clear expectations of benefits of using technology to support people with long term conditions such as COPD, and the potential benefits for their patients. The idea being to self manage being positive for patients and to support and build patient confidence. The patient being empowered to take responsibility for taking and recording readings; however, was not anticipated at the outset that the use of home health monitoring would prevent hospital admission. Some clinicians described their expectations of telehealth to promote self-management in a supported way by monitoring patients at home with daily feedback on their condition from patients.

> *"A tool to maintain optimum good health and allow patients to manage their own conditions." (Clinician)*

Pilot 2: Greater Glasgow and Clyde (Renfrewshire & East Renfrewshire)

In GGC, the COPD consultant within the acute hospital did not experience much impact from the new service, but continues to be supportive of its implementation. Staff report a general feeling of frustration with the service, in terms of delays in getting started; technology issues, and recruitment issues, but overall it was worthwhile to try it out.

COPD specialist nurse has seen it as mostly positive, despite being sceptical at the beginning on how patients would be recruited. With large recruitment numbers projected for the site, it potentially seemed to be overwhelming for staff, which was difficult for staff to respond too.

Organisationally, it has started to shift the views of some professionals regarding self management expectations and potential uses of telehealth. The service now is potentially more person-centred service which also provides carer / family and social support, helping with patient peace of mind and well being. Discussion with management confirms that there has been a considerable amount of learning at the

start of the service. It was also reported that a state of readiness assessment would have been highly beneficial at the start to highlight key barriers and challenges impacting on the implementation process. More early investment in staff training and learning prior to start of the project would have also helped. Staff acknowledged unrealistic expectations at an early stage and difficulties juggling with a number of different services pressures and competing priorities within the acute hospital. This service could easily have become vulnerable if local champion becomes unavailable. Future consideration needs to be given as to how to integrate the service further. Strategically the telehealth service fits, but boundary / interface challenges remain.

Pilot 3: Lanarkshire

The COPD team's experiences of using the U4H technology were somewhat mixed. On one hand, it was generally agreed text based monitoring had offered the patients a greater degree of support, and provided the nurses with a more detailed view of the person's condition and visualisation of symptoms by patients. As one nurse noted the service has been well received by the patients:

> *"It gives the patients good support I think, patients love it... Especially patients that live alone; they feel quite (re)assured by it if there's somebody taking note of what their readings are and keeping an eye on things, and they've got a contact to us as well, but with the alert they know somebody is going to phone them."*

On the other hand, the team felt that with more detailed monitoring came more involvement on their behalf. It was noted that rather than lowering the nurses' workload, the U4H technology had actually served initially to increase the work being done by the team. This is due to the system generating relatively frequent alerts which require the patient to be contacted via telephone or in some cases visited for a consultation. The team certainly felt that the sheer volume of information provided by this new system has effectively added to their responsibilities:

> *"...normally when they were early supported discharge we would see them two or three times and discharge them and wouldn't have any contact with them until the next time they were in. But, because we're picking up on exacerbations we're going out to see them to assess them, give them a wee bit more reassurance and things. (So it) probably is increasing our workload, but it's maybe reducing admissions."*

Some felt that a proportion of these alerts might have previously gone unnoticed by the patient or been shrugged off as not being worthy of contacting the nurse for assistance. One nurse noted that the technology has perhaps simply provided the patients with a means of validating any concerns they might have about their condition:

> *"...it's as if as (the patients have) now got permission to say I've got this and I don't feel right, so I'm going to put in this (text). Whereas if they didn't have that as you say, they might not have bothered, they might have said, well I'll see how I feel tomorrow before I phone anybody."*

Monitoring the data received and ensuring it is correctly recorded has also added to the team's workload. During the trial phase of the U4H technology being in place, the team have had to enter the data collected into not only their own existing systems, but also the new database devised to support U4H data collection locally. Some felt that the system will generate less work when the restrictions of the trial

period are lifted, less focus on data collection and the service is better embedded into their services:

> *" I think it's really time to follow the protocols that have been given to us in the past really. Just outpatients have to text in five days a week for the first month, and then, well it's a week or two months. Most of them are quite happy just to take the equipment away and get in touch if they're unwell. So, I suppose… if you could come and go with them, it wouldn't be such an amount of workload as it is at the minute, because you're trying to meet the (U4H) criteria... I think if it wasn't a study and we didn't have to collect all the information, if we could just get on with it... (it would be better.)"*

Despite the increased workload, it was apparent that the nurses felt this new system of monitoring has been of moderate benefit to the participating patients. One of the nurses summarised the general thoughts of the team towards the U4H technology:

> *"I think that (the technology is) not hard (to use), but the hard bit is fitting it in with all the other activities that you've got and all the other data collection that you've got... The service is good and the patients (like it), but it is definitely taking up more (time)…*

Would they like to continue providing it?

Pilot 1: Ayrshire & Arran

All staff were agreeable to continue to offer the home health monitoring, as the benefits to patients were evident, as well as increasing staff capacity; however a number of improvements were identified by various staff members.

- Mainstream Integrated Service: Primarily the desire for home health monitoring to become a part of a mainstream integrated service rather than pilot projects was clear, together with the need for a more integrated monitoring system to allow easier sharing of patient information with professional colleagues.
- Clearer Recruitment Criteria: All participants felt that the referral pathway used in U4H was too restrictive, therefore suggested that this be widened to allow identification of patients from the community setting as in keeping with local health policy, as well as from hospital setting at time of admission for exacerbation.

  "clear pathways, good communication with staff and correct people involved"

  "very limited criteria create a reactive service" (Focus Group Participant)

  "recruitment targets for the project were unrealistic based on the cost of technology being experienced" (Interview Participant)

Clinicians expressed a view of home health monitoring having a role in providing a more integrated approach to patient clinical care in the community for COPD. In particular, some of the clinicians delivering the home health monitoring service felt that the service supported discharge from hospital back to the home setting.

> *"A supported discharge with telehealth monitoring is proving to be a beneficial pathway" (Focus group participant)*

As the COPD home health monitoring in hosted by the Community Ward Service, it was felt that they would be able to offer a more proactive approach, patients receive

a full follow-up which is beneficial to their care, with a realistic expectation discussed with patients at the outset.

Staff acknowledge that deployment targets under U4H had not achieved the scale, which was disappointing and frustrating for staff and influenced by Integration Reform. The telemonitoring service will continue to be supported through national Technology Enabled Care programme across Scotland.

Pilot 2: Greater Glasgow and Clyde (Renfrewshire & East Renfrewshire)

Responses from the group were mixed. Having sight of outcome data might help make a more informed judgement. The service would be best placed within a community infrastructure rather than a hospital setting. However, for patients who were recruited into the new service, it has been a positive experience and would be worthwhile continuing it.

Management describe the service as being well resourced and in principle it supports a number of key strategies for the organisation, namely Older People's Strategy, Supported Self Care and the current Clinical Services Review. TEC (Technology Enabled Care) programme will help with mainstreaming the service over next three years. But scalability still remains a concern.

Pilot 3: Lanarkshire

The telehealth solution introduced into the COPD team has now been adopted and made available to patients as part of a mainstream service and part of Technology Enabled Care provision in Lanarkshire. There will be amendments made to the criteria and monitoring requirements for the COPD group.

Were they satisfied or dissatisfied overall with the new service? To what extent?

Pilot 1: Ayrshire & Arran

Overall, staff were highly satisfied with the home health monitoring service, mainly due to the patient benefits. All participants felt that, with the correct referral criteria, it is possible to save time as there is less need for face-to-face contact, with a reduced number of visits to the patient (less associated travel time, etc). This results in an increased staff capacity as time is saved on patient visits. Telehealth services need to be targeted to right patients

> *"Less house calls, less out of hours calls, patient empowerment." (Interview Participant)*
>
> *"Increases capacity of clinician." (Focus Group Participant)*
>
> *"Since the first patients have had the equipment in their homes, I have had less need to see them in surgery. Patients seem to be in more control of their condition."(Clinician)*

Pilot 2: Greater Glasgow and Clyde (Renfrewshire & East Renfrewshire)

The project was very frustrating at the beginning as it took a long time to set up, with no identified staffing resources. It took over a year to start recruitment into the service. The service has been going well within the last months, and it has been a more positive experience for staff and patients. However there is now the additional

frustration that the project is about to end just when it was beginning to get better, and disappointment that the project extension was not granted.

From a management perspective, results show that original deployment targets haven't been met, but there is a recognition that these were potentially too ambitious. There is a feeling that at this stage, a significant amount of progress and learning has been made over the past 18 months which will be applied beyond U4H.

Pilot 3: Lanarkshire

Mixed feelings reported by the staff group. Staff can see that the new telehealth service offers greater involvement for the patients, more detailed monitoring and better staff coverage in the case of any emergencies. However, their workload has increased due to sensitivity of alerts and patients reporting more minor changes in their condition which might have previously been left until their next appointment. There is uncertainty amongst the group if the lower number of face-to-face visits balances out the higher instance of follow up phone contacts. Nevertheless, the additional time spent was deemed worthwhile given the quality of the data gathered and the benefits for the patients, i.e. reassurance and better understanding of their condition. It is likely that with time the additional burden placed upon the teams will lessen as both patients and staff become better acquainted with the technology, as will the occasional problems with patient data entry that were highlighted in relation to the text based system.

Which of the staff's expectations were met, and which were not?

Pilot 1: Ayrshire & Arran

Some staff had anticipated that the use of home health monitoring for patients would create a dependency, however this was found not to be the case. Staff found that the use of home health monitoring instead resulted in empowered patients with better self management and awareness of their long term condition.

An earlier evaluation of a previous telehealth trial in Ayrshire highlighted that staff groups had suggested that the introduction of home health monitoring would create an inequality, in that only those patients who could afford wi-fi (it actually works through a roaming 3G SIM) could use the service. This was not found to be the case.

There had also been early expectations with the initial local trial that only those patients interested in their health would be expected to engage, that is, those patients most likely to engage with self-management. This is an area that still requires further exploration.

Pilot 2: Greater Glasgow and Clyde (Renfrewshire & East Renfrewshire)

COPD consultant didn't feel there were many expectations at the beginning of the project other than to implement and deploy telehealth at scale to COPD population. There was a suggestion that if data / literature had been available to help the service benchmark prior to "go live" it could have better informed what expectations might be. Earlier clinical engagement locally within the project was also highlighted as an area which could be improved.

There were some concerns at the start about the strict U4H recruitment criteria, and this proved to be the case, with it difficult to recruit sufficient numbers to the service and the time it took to negotiate any changes to the protocol for COPD. Another

issue was how patients would cope with the equipment, but on the whole this has been better than expected.

Recruitment of patients to the service and project has been slow. Higher non participation rate was experienced than expected, with patients reporting some anxieties using the technology. These patients were initially anxious about using telehealth, and required additional support from clinicians to get started. There is also a view that if project was extended, there would probably be more patients registered for the project.

Pilot 3: Lanarkshire

Staff anticipated the technology introduced would be complex and difficult to use. There have been some issues around IT or equipment queries related to the U4H technology, but not to the extent expected. Some of the nurses were unsure of how to operate and alter the Florence alert system, and others mentioned “muddling through” issues patients had raised with their devices. Overall, there is a sense that the more accurate data provided regarding the patient’s condition has been well received by those using telehealth, but it has not necessarily saved time for the nursing staff; the expectation was that it would save time. The trial had been positive in the respect that it had changed a number of clinicians' views on use of telehealth, particularly low tech solutions.

A wider discussion took place with the management strategic group focus group within NHS Lanarkshire regards technology expectations not directly related to U4H, but to technology available in general across the locality; it was agreed that such technology would have its limits with regards to patient contact, but could play a role in helping community staff reduce the amount of time spent travelling. The staff also expected the telemonitoring to reduce travel times; it was reported across the group that it had.

One of the key barriers identified to deploying newer technologies within the NHS was the poor state of the current IT infrastructure. One of the group highlighted that the existing IT systems and equipment within NHS premises are simply insufficient for the needs of the staff. This has been demonstrated in the project. It was felt that the basics of ensuring staff had access to computers had perhaps been overlooked, and there have been significant delays in eHealth service provision locally.

The lack of support for community staff was also raised. This had been anticipated. A few felt that ensuring these staff are able to access databases whilst carrying out home visits or clinics at sites in the community should be made a priority. It was noted that currently some of these staff even struggle to access databases whilst working in GP practices due to security and software issues.

There was clearly some doubt over the strategic approach to deploying technology at board level. Some felt there was a lack of prioritisation with regards to where newer technology is used. It was further highlighted that the services which would perhaps benefit most from newer technology often lack the basic infrastructure to enable such developments. Staff reported an imbalance in how the NHS is making use of new technology.

What was the valuation of the usability of the telemonitoring application(s)?

Pilot 1: Ayrshire & Arran

Previous evaluation of the telehealth pilot in Ayrshire found that staff had an expectation that older people would have difficulty using the monitoring devices. Overall, this was not the case, although in some instances patients did require further support which was offered by staff at every contact during the high level phase and patient visits.

> *"Patients found using the health PODs very easy, surprising considering the age group of patients that we are monitoring...they seem to take to using the PODs very easily" (Community Nurse)*

All participants had previous knowledge and experience of using modern technologies in the workplace. Patient clinical information is shared via the Anticipatory Care Plan using the Key Information Summary. The Community Ward also keeps a patient health record and medication plan updated in paper format within the patient's home. During the interviews and focus groups, it was clear that it was not felt that the home health monitoring technology had any positive impact on information sharing with other sites or organisations. This was felt to be due to the stand-alone nature of the monitoring system, which prevented results and information being shared with colleagues in primary and secondary care settings. It was however felt to be useful information, to demonstrate baseline and any anomalies in a clear and visual manner.

> *"good to be able to print off graph stats….demonstrate baseline and any anomalies clearly. Visual." (Interview Participant)"*

Staff found the home health monitoring equipment useful and fairly easy to use. Home Health Monitoring using the home health monitoring equipment and Clinical User Interface did present challenges for some, mostly surrounding technical issues with connectivity.

> *"Huge problems, patients struggle, faulty equipment, software issues, SIM card / signal issues, data not coming through. Server can go down at times. A few things need to be ironed out" (Focus Group participant)"*

> *"A few technical issues encountered. Response to these has been good but frustrating when away from own base" (Interview Participant)*

The overall impression, technical issues aside, is that the home health monitoring technology is a benefit and fairly user-friendly.

> *"…technology used to date appears to be reliable and easy to use"(Interview Participant)*

Pilot 2: Greater Glasgow and Clyde (Renfrewshire & East Renfrewshire)

From the patients' perspectives, the tablet was simple and easy to use. From the staff side, the CUI interface supporting the technology was very slow. This has now been resolved with an update, providing quicker access.

Pilot 3: Lanarkshire

In terms of the technology, the use of Simple Telehealth (SMS based service) was considered by staff to be very effective as the devices (i.e. mobile phones) are already used routinely in everyday life and appealed to patients and carers. The

system could be accessed outside the home, and has been used by several patients either at work or travelling outside the area. This level of support was valued highly by patients and staff, and enabled the telehealth systems to integrate into everyday routines and activities.

Were there any technical difficulties described by the staff which may have affected the quality of care delivered? How were these resolved?

Pilot 1: Ayrshire & Arran

Technical problems were encountered by staff and patients in using the home health monitoring equipment. This was mostly regarding connectivity or other technical issues which were resolved promptly by the equipment supplier. In addition, there had been some delays in getting the equipment installed in the patient's home.

All participants did, however, raise the point that the home health monitoring system (Clinical User Interface) is a stand-alone system and would benefit from being integrated with GP systems to improve patient care and safety.

> *"Unable to share information as GP's surgery doesn't have software. CUI and GP software not compatible." (Focus Group Participant)*
>
> *"CUI should be an integrated part of the GP clinical system." (Focus Group Participant)*
>
> *"Stand alone system is dangerous and unsafe for patients." (Focus Group Participant)*

Issues regarding the procurement of equipment and software were also raised as an issue, due to the nature of this new emerging innovative technology. It was recognised that Ayrshire & Arran were already committed to a supplier from a previous telehealth pilot, but that the supplier was part of a national UK framework which gave some level of confidence from a procurement perspective.

Pilot 2: Greater Glasgow and Clyde (Renfrewshire & East Renfrewshire)

There were issues with the CUI interface. Also there were initial problems with battery life for the saturation monitors. Cheaper batteries were provided by the supplier which proved frustrating for patients and staff. Additional batteries are now supplied with the unit, but these led to staff losing confidence with the system and technology. For large proportion of the time, staff were visiting patients and monitoring. Staff felt this significantly increased their workload and still have issues with trusting the readings.

However, when issues were identified they were dealt with quickly by the service. Nurses now do the installation of equipment with patients and Red Cross provide the uplift service.

> *" I think it really helps when the clinician who is recruiting can feel confident about the technology, and that it will be of benefit to the patient. As soon as problems start, you lose confidence, and it takes a lot of additional time to sort it out."*

For those who were recruited, patients acknowledged change of symptoms and knew they should contact their GP if need be; however if they were unable to get an appointment, the specialist nurses still visit to ensure the safety of the patients. Overall, there is a feeling that patients are taking control and self managing.

Pilot 3: Lanarkshire

No technical difficulties were reported by the group. However, staff felt that this type of technology would not be suitable for all patients. However, staff reported that those patients would be unreliable monitoring on any devices, so issues were not specific to the SMS system used. Telehealth systems need to be tailored to the right type of patients. Staff also had some reservations about using new technologies to deliver patient care and anxieties reported among some staff about their own technical skills and access to suitable technology locally to support remote working.

Main challenges were in respect of the ehealth / technology infrastructure, and several potential improvements were identified for the COPD team's data management infrastructure. Issues were raised with regards to the poorly thought out IT systems and equipment that are in place for the team. One of the nurses noted that in her office there were three different terminals, and each one offered access to a different system. This means that team members need to rotate between computers to complete their daily administrative tasks:

> *"there are three computers in our office and the three of us have to go on different computers to do different things. So, we can't get the database on one computer... and you can't get emails on mine... and I can only identify letters on that one... (so) that's all over the place."*

The nurses hoped that future technology would enable them to directly access the service's database whilst in the community. Clinical measures taken during home visits are currently recorded onto a paper based pro forma. These details are thereafter entered onto the team's database and the TrakCare system. This duplication of work was a significant frustration for the nurses: It was noted that having remote access to a patient's records could save additional time prior to appointments by helping cut down the amount of preparation time required for each patient. A few of the nurses also felt that databases were sometimes easier to navigate than sets of notes and offer more up to date detail:

> *"In hospital, even if you don't have their case notes to hand, you can look up clinical portal and get all the letters and lab results and things like that. So, it's easier to find out things, find out the background within hospital even if you don't have their notes to hand. But, out in community it's kind of virtually impossible... "*

The nurses were also enthused by the idea of having personal tablets for use whilst working in the hospital. On a practical level, such devices would offer a solution to the difficulty of finding a free computer terminal whilst out of the office:

> *"When you go on wards, like a wee tablet or something like that... it's really hard to get on the computers sometimes because the doctors are all sitting at them. So, you can't get on at the portal or whatever when you want to see information. "*

The nurses all have work specific smartphones which have come in use to help them keep informed of emails and the alerts generated by telehealth patients. These devices are also useful as satnavs when the nurses are out in the community.

It was also noted that whilst younger age groups are mostly happy to embrace the use of smartphones and computers, older patients do not have the same enthusiasm with regards to technology:

"I think there's an age group thing where they might have a phone that people call them on or they can call out from it, but they might not be able to text or anything else on it."

What were the experiences regarding collaboration between different professional groups (internally) in relation to the service?

Pilot 1: Ayrshire & Arran

Some staff groups did not feel that telehealth provided much additional benefit regarding collaboration between different professional groups. This is perhaps due to their role where integrated working with acute and primary care professionals was already established, as well as social care and other community based services. In contrast, many staff felt that the telehealth had indeed supported integration, communication, collaboration and trust between the different professions where they worked together to support the patients care plan.

Other clinicians felt that the telehealth service built on already good work relationships, feeling the different professional groups worked well together to provide the service, therefore improved links in primary care.

Pilot 2: Greater Glasgow and Clyde (Renfrewshire & East Renfrewshire)

Staff reported the potential for telehealth to improve working and patient management across acute and primary care professions, but that this had been significantly hampered by the number of changes underway across Renfrewshire & GGC in general due to Integration of Health and Social Care Services.

Pilot 3: Lanarkshire

None noted, but as a nurse led service support was varied from consultant medical staff. The Managed Care Network for Respiratory Diseases representing NHS Lanarkshire was sufficiently impressed with the telehealth service & technology to request the service be taken forward to other respiratory patient groups including Asthma. Learning has continued to be disseminated through this MCN networks locally & nationally.

What were the experiences regarding collaboration with other institutions (externally) in relation to the service?

Pilot 1: Ayrshire and Arran

The telehealth pathways and service have supported integration of health and social care. Although legislation in Scotland has integrated these two services, the initial collaboration between social work and health when directly applied to individual patients receiving ACP and telehealth, demonstrated improved relationships, trust, respect and self-direction.

Across all sites:

Outside deployment sites, there has been some collaboration with across boards and a sharing of learning, particularly around operationalising the service and best practice. Main challenge has been the differences across geographical areas with respect to organisation of services and clinical pathways. Staff reported not having sufficient time available to attend events and workshops which impacted on the extent of shared learning across all three sites.

What were the experiences regarding the relation with the patient while providing the new service?

Pilot 1: Ayrshire & Arran

In general, it was found that patients felt more empowered and confident about their COPD condition through the use of the home health monitoring service, with better understanding of their own readings and better self-management of their COPD on the whole. This, on the whole, has led to fewer exacerbations therefore reduced hospital admissions. Some patients did experience some anxiety in using home health monitoring, therefore did not continue.

Patient confidence and empowerment

Across both focus groups and one-to-one interviews with managers, it emerged that all participants perceived that there were real benefits to patient care; home health monitoring has had a positive impact on patients' lives by improving patient confidence in managing their long term condition through better education and self management supported via home health monitoring.

> *"Telehealth has made a huge difference within the service, patients have better understanding of conditions, medications and things get done faster and easier." (Focus Group participant)*

Participants described how use of the Home Health Monitoring technology enabled improvement to providing patient care, with anecdotal evidence of service users and carers of reduced number of exacerbations and hospital admissions, therefore increased patient confidence.

> *"A supported discharge with telehealth monitoring is proving to be a beneficial pathway." (Focus Group Participant)*
>
> *"Very useful to collect baseline data to empower the patients to take management of their own care." (Interview Participant)*
>
> *"Can create a dependency / expectation of frequent contact." (Focus Group participant)*

Clinicians also described patients feeling less lonely and isolated as a result of telehealth monitoring, as patients developed improved relationships with clinicians.

It had also been evident that patients began with a focus on the long term condition for which they were introduced to the home health monitoring, but patients then felt more empowered about their general health and would be more aware of their other health needs.

Reduction in exacerbations and hospital admissions

The majority of clinicians involved in the delivery of home health monitoring considered that the service provided to patients at home was preventing and therefore reducing the number of hospital admissions, particularly as it allowed patients to be more in control of managing their own condition to therefore recognise when their readings indicated a deterioration, allowing for earlier action and therefore intervention to take place.

> *"Patient is empowered and educated to take own readings, record readings, self manage and identify when condition is deteriorating and take action" (Focus Group Participant)*

A concern was raised that there was a fear of creating a high expectation of frequent contact.

> *"can create a dependency / expectation of frequent contact" (Focus Group participant)*

Many clinicians felt that any deterioration in their patients condition was identified early, allowing for intervention by the nurse or GP at an earlier stage, for example, advice over the telephone or to prompt the use of steroids and antibiotics early.

> *"allows us to control the entry into steroids and antibiotics eary, improved their education, effect on the system very positive with reduced visits and hospital admissions" (clinician)"*

Pilot 2: Greater Glasgow and Clyde (Renfrewshire & East Renfrewshire)

Staff reported that overall patients viewed the system positively.

> *"Patients have really liked the system and felt that it helped them managed their condition better." (focus group participant)*

Pilot 3: Lanarkshire

Patients are overwhelmingly supportive of the technology. The system enabled more involvement in managing their COPD condition by both patient and in some cases their spouse. However, some are more ready to report feeling slightly unwell and feel justified in seeking greater contact from nurse. There were also some instances where patients accessing the system did not have a mobile phone. If this was the case, patients were given a smartphone "pay as you go" with appropriate software added by the project team.

How do the involved professionals describe the added value and the drawbacks of the new service?

Pilot 1: Ayrshire & Arran

Added value: telehealth alerting clinicians at an earlier stage of any deterioration in a patient's condition, allowing earlier intervention with appropriate medication or other treatment advice.

> *"Because we check the alerts daily, we have managed to contact a number of patients showing early signs of exacerbation of COPD and advised them to start their medicines in reserve, possibly averting a hospital emergency admission." (clinician)*

An additional outcome that was also identified by clinicians was that the regular blood pressure and oxygen results through telehealth equipment had allowed identification of other health issues which led to further diagnosis leading to provision of additional healthcare services for these new conditions.

Drawbacks described by some clinicians included increased workload, as the results submitted by patients have to be monitored daily with daily phone calls to the patient.

Pilot 2: Greater Glasgow and Clyde (Renfrewshire & East Renfrewshire)

Added value: The service has raised awareness / buy in from (committed) COPD patients who like the control it can give them over their own condition. However,

some patients do become obsessive with and can fixate on their saturation levels etc. If patients' readings are good, they can feel reassured and empowered for that day. Staff noted that it's about being able to select the right patient.

In addition, the nurses now have video conference link through their laptops which will allow them to view the patient face-to-face. This is still to be used within the service, but staff are keen to explore its potential uses to support home health monitoring.

Drawbacks: Staff felt the process to be very time consuming and difficult to determine the value of the service without sight of the data that has come out of it. Also, having to change the U4H protocol mid-project to allow adequate recruitment caused more changes which caused disruption within the service. Staff were very clear that if additional hours had not been funded (currently 7.5 hrs) then it would be difficult to facilitate the service due to the existing pressures on the service.

Patients have voiced their disappointment about the project "ending"; this may fuel some anxiety with certain patients when the telehealth services is reprovided within community services rather than within the acute hospital. Overall, there is a feeling from staff that it is a worthwhile project, but perhaps long term is better in a community setting rather than acute. There would be better recruitment and would hopefully lead to admission avoidance.

Pilot 3: Lanarkshire

Added values are a more accurate, accessible and detailed picture of the patient's condition; reassurance for patient; better coverage for alerts (other staff can be made aware of alerts and respond if regular nurse is not available).

Drawbacks include higher number of contacts due to more frequent alerts; more time spent on data entry due to lack of integrated databases; staff frustrated by level of work generated due to tight study criteria and data collection involved in the project. Staff reported that at times the volume of data being collected for evaluation detracted their clinical time for deployment telehealth and patient care. This would not be the case in real life.

Patients who potentially had less capacity to use the technology would benefit from tailored training sessions to meet their individual needs. Clinician staff did not feel that they had the capacity to offer this. Options are now being explored within the team to include the development of support from an assistant whose role would be to offer this level of support as required to service users or outsource to third sector.

Do involved professionals suggest any actions to overcome existing barriers to and to support the implementation of the new service?

The outcomes of the focus groups and interviews, on the whole, illustrated a reasonably high level of consensus of the themes. Many experiences were shared amongst the clinicians, with a lot of shared perspectives and views with regards to what could be done to improve the current service.

Pilot 1: Ayrshire & Arran

Clearer Recruitment Criteria

Overall, good progress has been made in clarifying the recruitment process, however as a result of initial delays in the project it is unfortunate that the number of

COPD patients to have experienced the home health monitoring intervention has been significantly fewer than anticipated.

It is recommended that the criteria for recruitment be reviewed, and for them to be less restrictive and more proactive. Clinicians, having in depth knowledge of their patient's condition, should be allowed to identify those patients who are likely to gain most benefit from home health monitoring, whether these patients are currently in a community or hospital setting.

Mainstream Service

It is clear from all participants that there is an appetite for home health monitoring to be adopted as a mainstream service within NHS Ayrshire & Arran, to work in conjunction with existing clinical care models and patient self-management / education. This would require full support from clinical leads, the new HSC partnership directors, with a clear strategic plan for technology enabled care and sustainable approach to funding.

Integrated Monitoring System

Recommended that work to link or integrate the CUI with other clinical systems (e.g. GP system) to allow sharing of patient information between various clinicians in a safe and effective manner.

A review of the monitoring system is required to assess usability at scale, prior to renewal of the procurement contract with the current supplier.

Awareness Raising

Further work required to educate staff, patients and carers about the benefits of home health monitoring. In particular, for clinical staff in a variety of settings to be made fully aware of the service offered by home health monitoring, to allow it to be offered to suitable patients as routine service provision. This could best be achieved through the extended communications plan and tailoring information to suit the professional groups involved (i.e. what's in it for me).

Pilot 2: Greater Glasgow and Clyde (Renfrewshire & East Renfrewshire)

Staff didn't feel there were barriers as such, but it was difficult with no staff resources available at the start. If the service was to continue, would be happy to be involved. Also, it would be advantageous to provide a 7-day service rather than current Mon-Fri.

Recruitment Criteria need to be better defined from the start, and allow for it to be revised as it is embedded into mainstream service. Telehealth service better placed within community setting with linkages to acute care.

eHealth Infrastructure: telehealth systems used are still largely stand alone; it would be highly beneficial for these to be more integrated with other IT systems used. Without this, telehealth won't become a fully integrated component of healthcare delivery.

For wider implementation, it would be wise to ensure that all IT packages were tried and tested, and any issues rectified prior to commencement of service.

Pilot 3: Lanarkshire

Overall, there was a strong consensus within the group, that the telehealth service was as a good way of monitoring and fostering ownership of a condition with patients, but feel the criteria required by trial period (i.e. more frequent contacts during initial month) has increased instead of easing workload.

Will be easier to use once these criteria / protocols are withdrawn and staff have the flexibility to be able to tailor the protocols based on local clinical standards and individual needs of the patient group. For example, some patients benefit from a high number of text prompts and reminders, whilst some patients have asked that this number be reduced.

The group also felt that it would be useful for staff to have some additional training in strategies to support patients to adopt telehealth and engaging with patients re self management.

Improved eHealth infrastructure was repeatedly raised as a theme by staff as a significant barrier. Senior management need to use the national Technology Enabled Care programme to push forward priorities within eHealth to support telehealth.

D.2 Applied Methodology

Summary overview for all three deployment sites.

What methodology was used to gather the information and to elaborate the report?

This element of the evaluation was undertaken using focus groups and one to one interviews, with pre-defined semi-structured questions as agreed by the Scotland U4H Evaluation Group and U4H WP3 Evaluation Team.

Each of the deployment sites involved carried out separate focus groups due to the differences across service delivery models and types of technology in use by the teams deploying COPD Services.

Topics covered within the focus groups discussions included:

- Staff experiences (needs/expectations).
- Staff attitudes (acceptability/satisfaction).
- Initial clarity of service model.
- Communication.
- Experiences of Technology prior to U4H.
- Experiences of U4H Technology.
- Successes and challenges in adoption of telehealth
- Key areas for future service improvement/development

Analysis

The data collected from focus groups and one-to-one interview discussions were analysed using thematic content analysis which was completed by qualified evaluation professional. Those facilitating the focus groups and completing the

analysis had some prior knowledge of telehealth services and/or large scale change management programmes which was well received by the participants. Each deployment site provided separate reports summaries based on each disease condition report based on the evaluation questions. These responses have been located under each question and presented here.

In addition, Lanarkshire provided a collated analysis and report based on the results of the focus groups carried out across all three conditions in U4H – COPD / CHF / Diabetes.

Focus Groups Participants

Participants were identified, based on criteria of recent or regular ongoing involvement with U4H. The focus group discussions were carried out in a semi-structured manner, using pre-defined questions as previously agreed by the Evaluation Group. A number of administrative, clinical and managerial staff were identified. Due to staffing levels during period of summer annual leave, it was not possible to have all staff present.

One-to-one interviews

A number of senior managers were identified to participate in this qualitative analysis, and were invited to be interviewed on a one-to-one basis, using the pre-defined questions, however omitting those questions which were clinically based. This was carried out to ascertain views and experiences from the managerial perspective.

Which professionals/staff were interviewed or involved in some other way in the assessment of the organisational impact?

The following clinicians and other staff were involved in focus groups or were interviewed on a one-to-one basis:

Ayrshire & Arran	Greater Glasgow & Clyde	Lanarkshire
Community Ward GP (1) Community Ward Advanced Nurse Practitioner (1) Respiratory Sister (1) GPs with specialist interest in COPD (1) District Nurse/ANP (1) Long Term Conditions and Community Ward Manager (1) Head of E -health Service Delivery (1) Director of Health and Social Care (1) Procurement Manager (1) Head of Finance (1)	Consultant Respiratory Physician (1) Specialist respiratory nurses responsible for monitoring & delivery of the telehealth service(2) Community respiratory nurse – responsible for supporting the delivery of telehealth services (1) Head of Health & Community Services provided strategic leaders for U4H programme (1)	Specialist respiratory nurses responsible for monitoring alerts and managing patients reviewing the telehealth service (7) Strategic focus group – key stakeholders from U4H steering groups & service mangers form across COPD / CHF / diabetes. (6)

Appendix E: South Norway - Staff views

Experience overview – key statements from the interviewees

Preliminary experiences from the project are gathered through written feedback from all of the project partners, with subsequent verbal review / workshop. They were asked to answer questions about the project from a patient perspective, an employee perspective and an organisational perspective. The main findings are listed below:

Positive experiences
Patient perspective
- Felt that the staff were close by and available, without a physical presence. - The patients felt secure with daily contact with professionals. - Improved follow-up after release from a hospital and felt cared for. - The understanding of their illness and treatment improved. - Feeling more familiar with symptoms, personal treatment and medication - Personal mastering, empowerment. - More focus on mastering chronic illness and living with COPD than we had foreseen. - Possibility of close follow-up, even though the patient lives a long distance away. - Presumed reduction in rehospitalisation in a clinic (not documented).
Employees
- Video conferencing can give more of a feeling of close contact than telephone contact. - Tools with specific parameters and measurements can help in a regular workday, and help provide more correct follow-up of the patients. - Greater skills for COPD within the staff in the municipalities. - Greater skills for telemedicine within the municipalities and at the hospital, prevention and mastering strategies. - Information, measurements and evaluations of the patient are readily available. - Greater professional skills for the employees, both in relation to pulmonary medicine and in relation to patient training and communication. - A new way of following up on patients. - Frequent contact with hospital pulmonary nurse regarding individual patients, and COPD training. - Interesting and future-oriented work tasks.
Organisational level
- The organisation gains experience with the use of technology and telemedicine through participating in the project. - Contributes to skills and experience in coordination between the hospital specialists and the primary health service. - New experience, developing legal agreements, electronic messages and routines in the inter-municipal collaboration. - Close collaboration within the individual organisations among various partners (IT, administration, home services, the primary physicians, telemedical centre). - The cooperation with the physicians is not significantly affected.

Disadvantages
Patient perspective
- Extensive training in a difficult life situation. - Many of the questions are demanding according to patient feedback. The forms are only relevant during the project period. - Decisions must be made in a stressful situation at the hospital. Many of the patients are very ill. Some patients state that it is difficult to be included, because they do not know the full consequence of participating. Relatives who can support and encourage the patient are beneficial to the inclusion and implementation. - Training during hospitalisation takes place in "busy" surroundings at the hospital ward. This may interfere on the training and the ability to concentrate. - Some patients reported that the use of the technical equipment was more stressful than useful. - It is difficult for many people to open the suitcase. - Tremors, cold fingers, impaired vision and impaired hearing make it difficult to use the equipment. Impaired hearing can, however, be improved using headphones. - A greater focus on the disease can be demanding for some patients. - When technology failed or became too complicated, this caused additional stress in a difficult situation. - Too great of a focus on measurements made by the patient. - Possible lack of direct contact with medical staff. - Difficult for some patients to return the tablet.
Employees
- Data registration and training has been very demanding in some cases. - The Hospital Anxiety and Depression (HAD) and Sense of Coherence (SOC) forms have provoked emotional conversations. - Complying with patient confidentiality can be difficult at times in a ward with several beds in one room. - Employees at the centre do not meet the patients in person. - Observing symptoms such as skin coloration, respiration rate, sounds from the chest, etc. is difficult when the patient is not physically present. Good sound and image quality improve these conditions. - The uncertainty with respect to evaluations and decisions that are made, compared to physical situations in the patient's presence, may be great. - Technical challenges may take away focus and time for employees at the expense of professional health related follow-up. - Duplicate charting creates unnecessary extra work, and may be a possible source of errors with an impact on patient safety. When combined with technical errors in the “event journal” this challenge is particularly demanding. - During the project period, employees have used much time to try to solve problems outside their field of competence. For example, medical staff have had to deal with technical problems. - Requires continuity in the follow-up, difficult to coordinate with shifts, particularly on Saturdays. A limited number of employees at the telemedical centre make the service extremely sensitive to vacations and sick leave.

Disadvantages
Organisational level
- Temporary lack of office, which caused changes of location (and much equipment had to be moved) was a practical concern for the Pulmonary Unit. - In some cases, training had to be conducted at the patient homes (appr. 10%). - Reports and messages have to be written on several types of documents (which are not compatible with each other - e.g. a DIPS document and NC document) and sent to several different stakeholders (the home municipality, the service municipality and telemedical centre). - The project team has been committed to the scientific protocol in U4H, with limited options for flexibility. (Only applies to project phase.) - Keeping data traffic expenses within the existing budget (BHM). - Challenges related to availability of suitable equipment based on needs and technical specifications (BHM).

General Input
Employees
- New approaches of patient follow up. - Employees at a telemedical centre need more technology skills than before. - Cooperation with home care services has worked well throughout the municipalities.
Organisational Level
- Previously a patient in a critical phase has had follow up at the hospital; it has not been the responsibility of the municipality. This change in responsibility has been a challenge in staffing resources and competency needs. It is also possibly a basis to avoid new exacerbations. - More systematic follow-up on daily questions, objective goals and CAT than customary practices for following up on the same patient group within a municipality. - Follow-up was based on diagnosis in contrast to the patient's functional level which is used to determine the need for most municipal services. - Telemedical service is a new service in the municipality, also in an inter-municipal context. - The municipalities have the responsibility of assigning needed healthcare services to their own citizens. In the project, SSHF have assigned municipal services to patients in the study, this may mean that home health services can visit the patient that does not have any other medical services in the municipality on an as-needed basis determined by the telemedicine centre. This means that the patients may receive a single visit from the home care service, if needed, after an evaluation made by the telemedical centre. - The project has given the patient more knowledge about their illness; this may ease communication in the future. - Future-oriented project. - Profiling of the unit's function (BHM). - The people who worked directly with the project had good and positive attitudes. Others who have been involved sporadically have not had the same understanding and motivation. This applies, for example, to primary care physicians who do not get involved unless they are dealing with specific patients. Some of them are positive about the project, but some are standoffish, since they are not involved directly. Most wait to engage themselves with telemedicine until they are required to.