Residents of care homes are becoming increasingly frail, with complex healthcare needs that require proactive management in order to maximise quality of life. A pilot of a new model of care was set up in three residential care homes for the elderly in Sutton. This involved using technology to remotely monitor residents using remote clinical case management by dedicated specialist clinicians. The project aimed to enable the early detection of potential exacerbations or health deterioration, and the initiation of earlier treatment interventions, and thus reduce the need for urgent crisis management and acute hospitalisation. It was also expected that by empowering care home staff, through increased knowledge and access to remote support, they would be more confident and able to manage their residents’ health needs effectively.

Initial evaluation suggests the pilot of Telehealth within residential care homes has not demonstrated any discernible benefits in terms of reduced 999 calls, A&E attendances or non-elective hospital admissions. Further evaluation is expected over the next two months which may demonstrate benefits to both the residents and the healthcare economy.

2.0 Background to the pilot

It has long been evidenced that residents of care homes have complex healthcare needs, reflecting multiple long-term conditions, significant disability and advanced frailty (British Geriatric Society 2015). As our population continues to age and grow, it is imperative that new models of care are developed to support the management of the increasing pressures this population may place on the acute sector, as well as improving the quality of care provided to residents. Smith et al (2015) note that emergency admissions are higher for those aged 75 from geographical areas with higher numbers of care home residents. With 6 per cent of Sutton residents aged 75 and older residing in a care home, the population sits one and a half times
above the national average of 4 per cent (Institute of Public Care 2015), putting the area at higher risk of increased pressure on the acute sector.

Whilst it is recognised that hospital admission can cause high levels of anxiety and confusion in care home residents, as well as pose greater risk of nosocomial infection and deterioration in physical condition, unnecessary hospital admissions are still extremely common. Some studies estimate that this population may account for up to 66 per cent of all non-elective admissions of the over 75 population (Smith et al 2015). In addition, care home residents are known to require a high level of support from primary care and community services, and may attend A&E when there is deterioration in their condition, often resulting in unplanned hospital admissions.

Telehealth is not a new concept and has been used successfully to support individuals to manage their long term conditions (Neal et al 2017) but its utilisation in residential care settings has been slow to develop and the evidence of effectiveness has been mixed. Technology can play an important role in empowering residents and their carers; supporting them to monitor their health and take early action when changes are noted. In some circumstances, earlier recognition and intervention for a deteriorating clinical condition will reduce the need to use urgent care services and may prevent an unplanned hospital admission. There are different models of Telehealth available and some use monitoring technology to connect the care home residents to their GP more effectively in order to monitor health status and intervene when required. Using this method, two small studies in South Tyneside and the Isle of Wight demonstrated significant reductions in ambulance activity of almost a quarter (22-24%) and a reduction in A&E attendances by 71%. Both studies also demonstrated over a third (35%) reduction in unplanned GP visits. In these areas, the telehealth pilots have been so successful that they have been expanded to include all care homes in their geographical area.

Sutton Homes of Care Vanguard had been testing and running a number of initiatives to improve care for care home residents and in 2016 began researching a telehealth initiative in order to meet core element 7 (Better use of technology in care homes) of the NHS England’s Enhanced Health in Care Homes Framework (NHSE 2016). Sutton is an outer London borough with a population of 202,145 (Joint Strategic Needs Assessment, 2017). At the time Sutton had 81 care homes, of which 20 were nursing homes, 11 residential homes and the remainder for those with learning disabilities or mental health needs. There were a total of 1423 beds, of which approximately 30 per cent were funded through statutory provision by health or social care and the remainder funded privately. Sutton has been working in partnership with local care homes since April 2014 and various initiatives have been implemented during the last 3 years, including sign-posting and education packages, care home manager forums and bespoke training from in-reach community nursing. Sutton was awarded Vanguard status in spring 2015 based on these achievements.

In 2017, a pilot was initiated as part of the Vanguard to trial the use of telehealth in residential care homes for the elderly. It was anticipated that remote monitoring would be used for those residents with an unstable health condition to enhance early identification and proactive management of any deterioration.

3.0 The model of telehealth in residential care homes

The Royal Marsden Community Services were commissioned to undertake this pilot based on its experience of working with Telehealth Solutions to deliver telehealth monitoring for people with long term conditions living in the community. The model implemented assessed care home residents’ vital signs (on a tablet computer known as the POD) using a series of specifically designed questions to complete. The residents’ vital signs along with condition specific question responses are digitally communicated to the Clinical Triage team where Specialist Clinicians review the readings alongside previously set and agreed parameters for the individual resident. If responses to the questions are outside the set parameters or if vital sign readings are outside of pre-defined individual tolerances, the clinical triage team manage the alert through an agreed action response. Thus the technology provides remote monitoring and clinical case management by dedicated specialist clinicians. The action response protocols were determined by
community services, using existing services available to residents in Sutton, and the clinical triage team will advise the care home regarding an appropriate course of action. An outline of the model can be found in Appendix 1.

All older people’s residential care homes (11) in Sutton were offered the opportunity to be involved and three homes put themselves forward. The care homes were recruited onto the pilot in a phased approach and their details are outlined in Table 1 below. Each care home had an initial 1-month of support and training from the care home liaison nurse to identify appropriate residents, gain their consent and support staff to register them onto the mobile device and commence monitoring. Residents that may be appropriate for remote monitoring were identified based on existing clinical information, risk stratification and the risk of hospital admission due to an unstable health condition. The frequency of routine monitoring was agreed jointly with the care home liaison nurse and care home staff.

<table>
<thead>
<tr>
<th>Care home</th>
<th>Type</th>
<th>Total number of beds</th>
<th>Approximate number of residents on the POD</th>
<th>Month pilot started</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Residential</td>
<td>20-30</td>
<td>24</td>
<td>June 2017</td>
</tr>
<tr>
<td>2</td>
<td>Residential</td>
<td>20-30</td>
<td>11</td>
<td>May 2017</td>
</tr>
<tr>
<td>3</td>
<td>Mixed residential and nursing (only residential patients were commenced on the POD)</td>
<td>70+</td>
<td>9</td>
<td>April 2017</td>
</tr>
</tbody>
</table>

4.0 Identified Outcomes

It is anticipated that by providing remote clinical support to care home residents, including the collation of vital signs, will allow clinicians to identify a resident with a potential exacerbation and with the agreed intervention protocols will reduce the following:

- GP consults and care home visits
- Unplanned A&E attendance and hospital admissions
- Length of stay in hospital
- Reduction in calls to the ambulance service
- Reduction in referrals to community nursing

Through having remote clinical support during episodes of potential ill-health, it is anticipated that there would be improvements in the following:

- Resident experience, including timely access to health interventions
- Knowledge and confidence of care home staff to manage the resident
- Partnership working relationships across the local health and social care economy
- Resident ability to self-manage
- Staff awareness of early warning signs regarding clinical deterioration of patients.

The evaluation of this pilot is in two phases. This report forms an initial evaluation at nine-months, which has compared acute activity levels for the three care homes involved against their previous activity and this is presented below. The second part of evaluation is being completed by the Royal Marsden Community Services and Telehealth Solutions at the end of twelve months. In addition to acute activity for individual residents, they will consider any changes to unplanned GP care home visits, changes to community nursing referrals and the qualitative benefits in terms of resident experience and care home staff experiences.
The data is sourced from London Ambulance Service and from Epsom and St Helier University Hospitals NHS Trust, and includes activity from April 2013 and to January 2018 (except care home 3 which opened in autumn 2016). The evaluation method used for each data set is to divide monthly activity for each home by the number of beds in the home, in order to compare the homes with each other. Each home is compared against its own previous activity using SPC (Statistical Process Control) charts, where sustained improvement is indicated when there are seven consecutive months on or below the mean. The data should be interpreted with some caution as it includes all residents within the home, not just the residents on the POD as data which identifies individuals is not accessible.

**Changes to 999 activity**

Comparison of the London Ambulance Service’s (LAS) activity data for each home for the first nine months against all previous activity showed that the PODs have had no impact on the number of 999 calls. This is illustrated in charts 1-3 below.

These charts illustrate that for Care Home 1 and 3, the pattern of variation before and after the introduction of the POD remains similar. For Care Home 2, after the POD was introduced, there were four months below the mean however activity increased for three months before dropping to below the mean in the final month, suggesting a change in activity but not sustained. Care Home 2 generally calls 999 about two-thirds more frequently than the other homes. Overall, the use of the PODs in the three care homes has had no impact on 999 activity.
Changes to A&E attendance

Comparison of the hospital A&E data for each home for the first nine months against all previous activity showed that the PODs have had some impact in Care Home 2 but no impact in Care Home 1 or 3, as illustrated in charts 4-6 below. For Care Home 1 and 3, the pattern of activity before and after the introduction of the PODs remains similar. For Care Home 2 however, there is evidence of a sustained reduction in A&E attendance as the data points are on or below the mean for 8 consecutive months. These are encouraging findings however Care Home 2 was also involved in a pilot study for ‘Wellbeing and Health rounds’ from November 2016-July 2017, which overlaps with this pilot from May-July 2017. Wellbeing and Health rounds were piloted to deliver a dedicated weekly visit to the care home by the care home liaison nurse. The purpose was to identify residents where there were concerns over their health or wellbeing to enable early and proactive interventions. As these two pilots ran concurrently in Care Home 2, we cannot be certain that the reduced A&E activity seen is purely a result of the Telehealth PODs.

![Charts 4-6: A&E attendances per 100 beds for each Care Home in the pilot](image)

Please note the following:

- Care Home 3 opened late in 2016 and therefore there is only 12 months of data available compared to care homes 1 and 2.
- The mean (red) and control lines (green) for the SPC charts are created using the data points before and including the month the POD was introduced, apart from Care Home 3, where they were created using all the data points because there was only a few months of data prior to the start of the PODs.

Changes to Non-Elective hospital admissions
Comparison of the hospital non-elective admissions activity data for each home for the first nine months against all previous activity showed that the PODs have had no impact on the number of urgent admissions. This is illustrated in charts 7-9 below. For all three care homes, the patterns of non-elective admissions are similar both before and after the PODs were introduced.

Charts 7-9: Non-elective admissions per 100 beds for each Care Home in the pilot

Please note the following:
- Care Home 3 opened late in 2016 and therefore there is only 12 months of data available compared to care homes 1 and 2.
- The mean (red) and control lines (green) for the SPC charts are created using the data points before and including the month the POD was introduced, apart from Care Home 3, where they were created using all the data points because there was only a few months of data prior to the start of the PODs.

Other outcomes

One of the aims for this project was to increase the confidence and competence of carers to manage their residents’ health conditions. Feedback from the care home liaison nurses identifies that some staff have felt empowered when talking to the GP. By having the resident’s observations available and patterns of changes over time they have been enabled to have a clearer and more meaningful conversation with the GP. This has strengthened the relationship between the care home and GP, which can only be positive with respect to resident outcomes. Further qualitative data will be collected and analysed in the second phase of evaluation.

Discussion of findings

The PODs appear to have had no impact on the frequency of calling 999 or on being admitted to hospital urgently. In Care Home 2, the POD appears to have reduced the number of people attending A&E. However, of the three homes, it was the highest attender of A&E prior to the introduction of the PODs by between two and four times. Also, it took part in the Wellbeing and Health Round Pilot around a similar time. It is therefore unclear whether it was the POD or the WBHR that made this improvement or maybe it was the combination of the two, or some other factor.
The data source used accounts for all activity in the care home, not specifically the residents on the POD, with the exception of Care Home 1 where all residents were initiated onto the POD. It is possible that for care homes 1 and 3, the activity data relates to residents who were not using Telehealth however this cannot be substantiated without patient level data.

Two further analyses are being considered. Firstly, to compare these three homes as a group with the group of other residential homes, although since the PODs were introduced at different times then deciding on which months to use is complicated. Secondly, to compare each home’s activity with the same time period from the year before, although this can only be completed with Care Homes 1 and 2 as there is not enough data for Care Home 3.

5.0  Financial costs and benefits of implementing the pilot

The project funded the technology, remote clinical element and nursing support. The costs for twelve months for each of these components are outlined in the table below.

<table>
<thead>
<tr>
<th>Element</th>
<th>Cost per care home</th>
<th>Total cost for 3 homes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote monitoring equipment and mobile device</td>
<td>£2,145.60</td>
<td>£6,436.80</td>
</tr>
<tr>
<td>Clinical user interface (1-30 residents)</td>
<td>£6,552.00</td>
<td>£19,656.00</td>
</tr>
<tr>
<td>1 GB Data-only Sim card</td>
<td>£50.00 per month</td>
<td>£700.00</td>
</tr>
<tr>
<td></td>
<td>(7 months only)</td>
<td>(2 homes only)</td>
</tr>
<tr>
<td>One full time Band 7 care home liaison nurse (mid-point)</td>
<td>N/A</td>
<td>£50,000.00</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td>£76,792.80</td>
</tr>
</tbody>
</table>

During the first nine months of the pilot of Telehealth in three residential homes, it appears that there have been no financial savings realised in term of 999 calls, A&E visits or non-elective admissions.

6.0  Key learning from the pilot

Several lessons have been learnt during the pilot, particularly relating to engagement and ownership, technical aspects and key requirements for the model to be effective.

Engagement and ownership

All three care homes volunteered to be part of this pilot. Initially engagement from both the manager and care staff was high; with carers interested in learning new ways they can support their residents to remain well. Prior to the pilot, none of the three homes monitored residents’ vital signs, either routinely or in an emergency situation. Early in the pilot, in one home, a resident with un-diagnosed hypertension was identified, providing instant feedback regarding the usefulness of the equipment and pathway. Unfortunately, after the first couple of weeks, engagement from staff in all three homes dropped off and remained variable throughout. This had a huge impact on the frequency with which vital signs were recorded and resulted in a significant amount of additional time investment from the care home liaison nurse to facilitate completion.

Despite putting themselves forward for the pilot, ownership of this pilot by the registered manager in each home was also variable and had a significant impact on how routinely residents on the POD were having their vital signs recorded. Overall, the use of remote monitoring has not been established as part of the ‘business as usual’ in any of the care homes.

Care home 3 provided particular challenge with respect to engagement. The home had been open for about 6 months prior to the pilot starting and the care team was still being established and expanded as more residents moved in. In addition, the home had a change of both registered manager and clinical lead during the pilot which significantly impacted on ownership of the project and completion of resident monitoring.
Although using tele-monitoring would be an indicator of effective and responsive care provision for residents, the monitoring of residents’ vital signs either independently or through the use of Telehealth, is not currently a contractual requirement in residential care settings.

**Technical aspects**

Although the POD software and tablets were already established, there have been several modifications made based on feedback from both the care homes and care home liaison nurse. Feedback from care home staff identified the resident registration process was too complex so this was simplified. A number of modifications were made to the software and front screen of the tablet to minimise confusion, limit potential for misuse and enhance ease of use.

For two care homes, their Wi-Fi coverage was variable and insufficient to enable accurate and timely recording of residents’ vital signs. This meant on occasions the recordings were not in real time as data was inputted when Wi-Fi was available. This was easily resolved by providing a 1 GB Data-only Sim (Roaming) card, however this did result in an additional cost of £50 per month per home.

**Key requirements for effectiveness**

- Consider mechanisms for engagement with care home managers, ownership is key
- Consider mechanisms for engagement with care home staff to enhance involvement and empowerment
- Consider a ‘trial period’ in the home to assess engagement and ownership
- Consider when to introduce Telehealth to the care home, for example it may not be appropriate to introduce into a new home that is still establishing staffing, structures and processes
- Sufficient time and resource from both the telehealth company and care home liaison nurse to support implementation and initial trouble-shooting
- Sufficient resident recordings in the initial period to enable setting clinical parameters for alerts for the individual
- Software must enable the care home liaison nurse to be able to quickly identify which care home the residents are in
- Monthly reports must be submitted and reviewed to monitor progress and evaluate impact

**7.0 Conclusion**

The initial nine-months of a Telehealth pilot within residential care homes has not demonstrated any discernible benefits, based on the data set interrogated. There was a small reduction in A&E attendance from one care home but this cannot be categorically attributed to the use of Telehealth. In purely financial terms, this pilot has demonstrated that the resource investment required, in terms of both money and time, does not represent value for money. As discussed earlier, one key element that is required for an effective model is ownership of the process and pathway within the care home and this lack of engagement will have had an impact on the expected outcomes of the project.

**8.0 Next steps**

The final twelve-month evaluation of this pilot from the community services provider is anticipated within the next few months. This will look at acute activity for individual residents on the remote monitoring and also consider the qualitative benefits in terms of resident, family and care staff experience. This second stage of evaluation may reveal unexpected benefits that have not been identified through this initial evaluation.
use of Telehealth will continue within residential homes, on selected residents to enhance management of their health conditions by the care home support team.

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9.0 References


Appendix 1: Outline of Telehealth model in residential care homes

**Care Home Resident**

**Care home Liaison nurse:**

 Risk Stratification

- Suitable for remote monitoring
- Consent from resident/NoK/BiA
- Set-up on POD
- Set clinical alert parameters for individual
- Determine frequency of vital signs recording

**Care home Staff:**

- Resident well
- Routine vital signs recording (BP, Temperature, oxygen saturations, heart rate, blood glucose level/weight as appropriate)
- Completion of questionnaire

**Additional vital signs recording**

**Care home Staff:**

- Resident unwell
- Contacts appropriate team, e.g. Prevention of admissions, GP, care home liaison nurse, 999

**Clinical Triage Interface:**

 System alert: vital signs out of range

- Contacts care home
- Discusses resident
- Uses triage algorithms