1.0 Executive summary

Many residents in nursing homes are approaching end of life and may need continuous medication delivered through a syringe pump to control their symptoms. The project, over a 12-month period, established training, competency and 24-hour support systems to ensure that registered nurses working in nursing homes were suitably equipped with the knowledge, skill and competence to manage this element of resident care. The project dispelled a number of myths surrounding the use of syringe pumps in nursing homes particularly relating to delayed transfers of care. A majority of nursing homes utilised the training and support on offer however achieving competence in this area of care was more difficult. The main reason cited for this was infrequency of use and over the 12-month period, a syringe pump was required by approximately 2.4% of the total nursing home resident population in the area.

2.0 Background to the project

Education and training is a cornerstone of delivering enhanced health in nursing homes and this project was part of the Sutton homes of care Vanguard training offer to care homes. In Sutton it has been recognised that nursing homes are looking after the most frail and vulnerable members of society, often with very little input or guidance from NHS services. It is also known that individuals entering a nursing home have a median life expectancy of 15 months (British Geriatrics Society 2011, Badger et al 2007) therefore the majority of residents at any given time will be...
recognised as 'end of life' and planning and support for end of life care should be the norm. There is an increasing drive both nationally (One Chance to get it Right, 2014) and locally (Sutton and Merton End of Life Care Strategy, 2011) to care for patients in the community and support patients to remain in their usual place of care for end of life. Therefore, ensuring good symptom control, through the use of syringe pumps is essential to facilitate this ambition. On this foundation, Sutton Clinical commissioning group was awarded funding from Health Education England (South London) to initiate a training programme for nursing home staff on the safe and effective use of syringe pumps to support residents at the end of life. By increasing the competence and confidence of nursing home (NH) registered nurses (RNs) to provide end of life care (EoLC) for patients requiring a syringe pump, the positive outcomes anticipated are:

- Improved quality and safety of end of life care delivered to residents and families
- Improve resident choice in nursing home placement
- Improve resident's dying in their preferred place of death
- Reduction in unnecessary admissions to hospital
- Reduce delays to discharge from hospital or hospice

At the beginning of this project there were 17 nursing homes in Sutton with a total of 497 beds. Two additional care homes opened during the project taking the total nursing beds in Sutton to 537. Since 2014, nursing and residential care homes in Sutton have been able to access the supportive care home team, a team of palliative care specialist nurses from community services who provide both individual resident case management and training to care homes that focuses on the 5 priorities of care.

3.0 Methodology and process

A steering group was established with representation from the clinical commissioning group, including the care home Vanguard and continuing healthcare team, the local hospice and the community services provider which includes the supportive care home team (EoLC specialist nurses) and community nursing. The group initially explored current understanding of the use of syringe pumps for end of life care in nursing homes and identified a number of myths and assumptions which are outlined in box 1 below.

| Box 1: Myths, assumptions and unknowns surrounding the use of syringe pumps for end of life care in nursing homes |
|--------------------------------------------------|--------------------------------------------------|
| Delayed or aborted discharges from hospital due to NH not being able to manage a pump | Patients continue on PRN doses instead of proceeding to continuous infusions |
| Delayed or aborted discharges from hospice due to NH not being able to manage a pump | Unknown proportion of transient staff in NH (bank/agency) |
| Lack of equipment in NH | Unknown competence levels in NH RNs |
| Unknown training levels in NH | Lack of knowledge of NH RNs |
| Unknown frequency of need | Unknown quality of training in NH |
| Patients will not have a choice of homes | All NH should be able to provide this care |
| Some homes are used frequently for ‘fast track’ CHC patients | |

A baseline audit of practice was conducted across Sutton nursing homes to gain clarification on some of the above issues and these results can be found in Appendix A. Following the baseline
audit and further discussion, the steering group recognised there are a number of challenges that this project sought to address:

- A two-tier system exists with seven NHs used more frequently for ‘fast track’ placements due to confidence that the home can manage EoLC, including syringe pumps; illustrates the dilemma of individual choice whereby residents may not be able to be admitted to or discharged back to the NH of their choice if the staff are unable to meet their need for a syringe pump.
- How to assess the competence of RNs, this must be to a consistent standard however under conditions of NMC registration, the individual must assess own competence; highlights the difficult balance between quality assurance and recognition of nursing homes being independent providers and individual professional accountability.
- Variability in GPs prescribing accuracy and confidence with syringe pumps, including concern about the ability of either the RN or GP to recognise prescribing errors.
- Frequency of use is low; highlighting issues with availability of equipment when needed and RNs being able to maintain knowledge, skills and competence to manage residents’ safely.
- Limited identifiable sources of support and guidance available to NH RNs specifically around syringe pumps.

To address these issues the steering group agreed to develop a practice-based training offer to general practice and this was provided by the specialist palliative care consultant from the hospice. These were advertised by direct invitation and through the locality-based Palliative care meetings. A separate training offer was made to nursing homes including classroom-based education, workplace-based supervision and competence assessment, as outlined in Appendix B and C. The study days were facilitated collaboratively by the supportive care home team from the community provider and nurse educators and consultant from the hospice. Work-based supervision and competency assessment was undertaken by additional resource within the supportive care home team.

The specialist nature of EoLC medication and syringe pumps was acknowledged and the potential for resident harm identified. To mitigate this, whilst recognising the variable skill and competence levels across different nursing homes, two system-wide 24-hour pathways of support were developed for ‘frequent use’ and ‘infrequent use’ nursing homes and these can be found in Appendix D. In discussion with nursing home managers, it was identified that a resource folder highlighting local best practice for using the syringe pump would also be beneficial for homes, particularly to facilitate staff support and education and this is outlined in Appendix E. The availability and quality of a policy surrounding the use of syringe pumps in each nursing home was variable and it was acknowledged that the development of a standard operating procedure specific to the safe use of syringe pumps within nursing homes (specifically using the CME Medical T34 ambulatory syringe pump, the ‘McKinley’) would enhance quality assurance across the local healthcare system. This can be found in Appendix F.

Throughout the project a monthly steering group was held and progress was reported through the Sutton Homes of Care Vanguard governance processes.
4.0 Identified outcomes

This project has run from June 2016 to June 2017. In order to evaluate the effectiveness of this approach and the impact on the expected outcomes, a number of measures and proxy measures have been assessed during the 12-month period.

4.1 Resident outcomes

It was assumed that by enabling nursing home RNs to safely manage a syringe pump, resident outcomes would be enhanced in the following ways:

- By enabling preferred place of death in the nursing home
- By reducing unnecessary admission to hospital
- By enabling a prompt discharge from hospital or hospice setting

**Improved number of residents achieving their preferred place of death (PPD)**

During the last 12 months there have been a total of twelve residents requiring a syringe pump for continuous medication administration during this project. Of these twelve residents, eight were identified through the project and four were discharged from the acute hospital directly to the nursing home with a syringe pump in situ.

Of the eight residents, three had the pump initiated during a hospice stay, one initiated in hospital and four were initiated within the care home. For every resident, the need to proceed to continuous medication delivery was identified by palliative care teams, either in the hospital, hospice or community. Seven out of eight residents achieved their preferred place of death in the nursing home. One resident wished to die in the hospice however no beds were available at the time of need. The individual’s family did however report a comfortable death in the nursing home. All eight residents were cared for within nursing homes that are familiar with the syringe pump.

As expected, syringe pumps were used for the management of pain, agitation or nausea and the pump was in use for an average of 25 days (range 4-60 days). Monitoring these residents' EoLC journey highlighted that for three residents the syringe pump was in use for longer than expected, in one case up to 60 days. This finding is interesting in that it highlights that syringe pumps can and should be used for good symptom control, even if the individual is not in the last days of life. For seven of the eight residents, their symptoms were controlled by use of the syringe pump. Good symptom control through the use of syringe pumps requires involvement of both nurses and medical staff however only one GP practice out of twenty-seven embraced the training on offer. This practice provides medical cover to a number of care homes and clearly recognised the value of this training.

Residents requiring use of a syringe pump to achieve their PPD within the nursing home represent 2.4% of the total nursing beds in Sutton. In comparison the number of nursing home residents achieving their PPD across Sutton nursing homes during the same time period (June 2016-June 2017), without requiring a syringe pump is 161 (77.8% of total deaths), highlighting that the frequency of use within the overall nursing home population is low. Due to the number of residents achieving their PPD in Sutton nursing homes, it could be assumed that residents do receive good support at end of life from both nursing home staff and supportive services.

The fact that there were four residents requiring syringe pumps that were not known to this project highlights an area for further development at a strategic level. There is a need to ensure that both
palliative care teams and the nursing homes themselves enhance communication about residents due for discharge or recently arrived into the care home with a syringe pump to ensure that appropriate support can be offered, both to the resident and the nursing home. Discussion with the nursing homes who cared for these four residents identified they felt confident to manage the residents symptoms and pump and reported a comfortable death in the nursing home.

**Reduction in unnecessary admissions to hospital**

From monthly hospital admission data it is impossible to ascertain which admissions from nursing homes, if any, were specifically due to a failure of end of life care. This appears to be due to the coding system used as there are no obvious diagnostic or procedure codes relating specifically to palliative and end of life care. However, soft intelligence across the local healthcare system due to existing close working relationships between acute, community and specialist providers concurs that there have been no unnecessary admissions to hospital from nursing homes, specifically relating to EoLC care.

**Reduce delays to discharge from hospital or hospice**

Of the eight residents requiring a syringe pump between June 2016 and June 2017, four were discharged from either the hospice or hospital. Discussions with the discharging teams identified that there were no reported delays in discharging these residents. The project has worked closely with the acute and hospice sector, particularly regarding the pathways of care which provide assurance for the discharging team that the resident will be safe and there will be no break in their continuity of care.

During the same time period, there were 72 people discharged from the hospital or hospice as a ‘fast track’ continuing healthcare placement into a nursing home. Many of these were enabled by utilising pre-selected nursing homes that have undergone the training and are known to be able to provide safe care for a resident, should a syringe pump be required. This has ensured there are no delays in transferring these residents out of acute settings.

### 4.2 Nursing home staff outcomes

It was assumed that by enhancing the confidence and competence of RNs to manage end of life care, including understanding the appropriate use and action of medications, setting-up and managing the pump and ongoing monitoring of the syringe pump and resident response, the quality and safety of end of life care would improve.

**Increased knowledge and confidence**

During the period June 2016-June 2017, five study days were held and a total of 71 RNs attended the training. Fifty-eight were RNs from Sutton nursing homes (about 50% of the total number of RNs working in Sutton nursing homes, see table 3), six were nurse assessors from the continuing healthcare team, two were from Nursing homes that have opened since the project commenced and 5 did not specify their place of employment. The steering group identified that it was important for nurse assessors from the continuing healthcare team to attend the training as they regularly visit nursing homes and form part of the support available to nursing home staff. For each training day, there was a mixture of RNs who had previously had training on the syringe pump (34%) and those who hadn’t (66%). The majority of RNs who had received training before reported it was more than 1 year previously. Participants were asked when they had last used the syringe pump
and this ranged from 2 months to 4 years. Overall, 36% of RNs had used the pump within the last year and for 64% it was more than one year ago.

Of the 17 nursing homes in Sutton at the start of this project, five did not send any staff on the study days despite persistent and targeted engagement with the home managers and nursing staff. The reasons for this have not been explored with the five homes, however none of these homes had used a syringe pump in the last year and therefore this training may not have been seen as a priority. One home caters for younger individuals with enduring mental health problems under section 117 and therefore may not have recognised a need for training in this area of care.

In order to assess the confidence of staff, participants were asked to rate themselves in four knowledge requirements for managing end of life care with a syringe pump. This was assessed at the beginning and end of the study day to establish a baseline and to determine whether the training was effective. The change in confidence is illustrated in Table 1. Following the study day, participants’ confidence recognising when to initiate the pump increased by 80% and confidence to use the pump increased by 59%. Participants’ confidence understanding medicines and trouble-shooting problems also increased following the training day although the change was smaller.

### Table 1: Change in confidence in four knowledge areas immediately following the EoLC and syringe pump study day*

<table>
<thead>
<tr>
<th></th>
<th>How confident are you using the McKinley syringe pump?</th>
<th>How confident are you to recognise when it might be appropriate to initiate continuous medication using the McKinley?</th>
<th>How confident are you in your understanding of the medications used in the McKinley?</th>
<th>How confident are you trouble-shooting any problems with the McKinley?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis pre training (N 61)</td>
<td>3.5</td>
<td>4.1</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Analysis post training (N 59)</td>
<td>6.3</td>
<td>6.5</td>
<td>5.4</td>
<td>5.8</td>
</tr>
<tr>
<td>Percentage change</td>
<td>80%</td>
<td>59%</td>
<td>35%</td>
<td>45%</td>
</tr>
</tbody>
</table>

* Not all participants completed a pre and post training questionnaire and some did not answer all questions

Educational theory recognises that learning is not usually achieved following a single event and participants were given six months following attendance at the study day to allow for consolidation, supervision in practice, reflection and self-directed study before their confidence was reassessed. During April 2017, questionnaires were sent to all staff who had attended the training from ten different nursing homes. The five homes that did not send staff were excluded, as were staff from two homes that attended the training in February and therefore would not have had sufficient time to consolidate their learning before re-assessment. Of the 50 questionnaires sent out, 21 were returned, representing a return rate of 42%.

Table 2 illustrates the change in confidence from baseline (pre-training) and at six months. It can be seen that confidence using the pump increased to represent a 100% change; however confidence in other areas of knowledge and skill demonstrated only marginal changes from
baseline assessment. Confidence recognising when to initiate the pump and being able to trouble-shoot any practical issues with the syringe pump actually reduced during the 6 month period.

When the returned questionnaires were separated into nursing homes that ‘frequently use’ the syringe pump and those where use is ‘infrequent’ a clear difference was seen. All RNs who worked in nursing homes that use the pump more often rated their confidence in all four knowledge areas as either 6 or 7, indicating they were very confident. In contrast, RNs working in ‘infrequent use’ homes rated their confidence much lower.

Table 2: Change in confidence in four knowledge areas six months after attending the EoLC and syringe pump study day

<table>
<thead>
<tr>
<th></th>
<th>How confident are you using the McKinley syringe pump?</th>
<th>How confident are you to recognise when it might be appropriate to initiate continuous medication using the McKinley?</th>
<th>How confident are you in your understanding of the medications used in the McKinley?</th>
<th>How confident are you trouble-shooting any problems with the McKinley?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis pre training (N 61)</td>
<td>3.5</td>
<td>4.1</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Analysis 6-months post training (N 21)</td>
<td>7</td>
<td>6.3</td>
<td>5.5</td>
<td>5.4</td>
</tr>
<tr>
<td>Percentage change</td>
<td>100%</td>
<td>54%</td>
<td>38%</td>
<td>35%</td>
</tr>
</tbody>
</table>

*Some participants did not answer all questions

Knowles’s theory of andragogy (1984, cited in Mulholland & Turnock 2013) identifies that adults learn by experience through a problem-centred approach and will learn best when the topic has immediate relevance and impact on their job. This theory seems particularly relevant to this project as it has involved the development of tacit knowledge, practical skills and problem-solving. The following direct quotes from nursing home RNs clearly illustrate the importance of exposure to situations where new knowledge and skill can be applied and then further refined with experience.

“Not really using the pump often enough to be confident”

“Haven’t used the pump yet so a refresher will be required as I haven’t been able to put knowledge into practice”

“Having a resident who needs the pump would be very helpful to gain experience and knowledge”

“I’m still struggling with medicines calculations for the syringe pump”

Question:

If you have scored your confidence in any questions as 4 or below, please indicate what you think would help to increase your confidence?
Competence to manage end of life care including syringe pumps

Of the 58 RNs from Sutton nursing homes who attended the training days, competence was achieved by 24 to date, representing 41% of those trained and 21% of the total number of RNs in Sutton nursing homes. Soft intelligence from the care home support team who conducted the competency assessments identified that competence was more easily and quickly achieved by those RNs working in the ‘frequent use’ homes compared to ‘infrequent use homes’. For many of the RNs, competence was not achieved in a single assessment, mainly due to difficulty with medication calculations and conversions. RNs working in homes that are unfamiliar with the pump voiced significant concerns around medication calculations. Two RNs have failed their competency assessment due to difficulties with language and understanding. Five RNs have been unable to be assessed due to either leaving their employment in the nursing home (three) or being on maternity leave (two).

Some RNs were identified as actively avoiding having their competency assessed. Although the reasons for this are unknown, it could be assumed that RNs working in nursing homes are less familiar with the concept of competence assessment, perhaps compared to a hospital or community-based nurse and therefore a degree of fear and reluctance is to be expected. One home that is a ‘frequent user’ did not engage with this project but may have used the principles of competence self-assessment outlined in the Nursing and Midwifery code of conduct for registered nurses (NMC 2015) and deemed that the training and assessment was not necessary for their staff.

The overall outcomes of this project, in terms of number of RNs trained and competent is illustrated in Table 3 below. This clearly shows that the training was embraced by many homes but the competence remains low. Interestingly six of the ‘infrequent use’ homes sent staff for training and three now have a proportion of competent staff within their establishment.

<table>
<thead>
<tr>
<th>NH</th>
<th>Number of substantive RNs</th>
<th>Pre-project</th>
<th>Post-Project</th>
<th>Pre-Project</th>
<th>Post-project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>25%</td>
<td>87%</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>28%</td>
<td>43%</td>
<td>28%</td>
<td>28%</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>100%</td>
<td>86%</td>
<td>86%</td>
<td>86%</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>71%</td>
<td>0</td>
<td>71%</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>0</td>
<td>60%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>33%</td>
<td>77%</td>
<td>0</td>
<td>44%</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>43%</td>
<td>100%</td>
<td>43%</td>
<td>43%</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>50%</td>
<td>0</td>
<td>50%</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
<td>0</td>
<td>100%</td>
<td>0</td>
<td>16%</td>
</tr>
<tr>
<td>11</td>
<td>8</td>
<td>12%</td>
<td>0</td>
<td>12%</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>8</td>
<td>0</td>
<td>37%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>0</td>
<td>75%</td>
<td>0</td>
<td>25%</td>
</tr>
<tr>
<td>14</td>
<td>7</td>
<td>0</td>
<td>57%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>0</td>
<td>25%</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
During this project, two further nursing homes have opened from large National chains. Both establishments have a training programme in place for the McKinley syringe pumps but have no processes to assess staff competence to safely manage this equipment.

### 4.3 Other outcomes

This project identified variations in compliance with the Pan-London Continuing healthcare in nursing homes AQP contract which states that:

> “Staff are trained in the use and management of syringe pumps and associated medication used in symptom control for EOoLC” (Pan-London CHC in nursing homes AQP NHS Standard Contract 2016/17 Particulars, p.22)

Within this project, there are thirteen nursing homes on the AQP contract and of those, four homes that have not utilised this training offer. Of these four, two reported they already had a number of staff trained and two homes have no staff trained. Interestingly all four of the homes that do not utilise the AQP contract sent a number of staff on the training.

This project enhances our ability as a local healthcare system to meet the National Framework for end of life care, particularly relating to five of the six ambitions; individualised care, fair access, maximising comfort, coordination of care and staff being prepared to care (National Palliative and End of Life Care Partnership, 2015). The implementation of system-wide pathways of support for all nursing homes as detailed in appendix D protect the element of patient choice of residence, by ensuring that should a resident require a syringe pump, regardless of which nursing home they live in, this can be provided for them. These pathways also ensure that the risk of harm is minimised and contained within the local healthcare system as the nursing home RNs are supported by services from the community provider who have a greater level of expertise in this area.

### 5.0 Financial costs and benefits

This project was enabled by sponsorship from Health Education England, South London to the value of £65,000. The money was spent on a specialist palliative care nurse to support the training and competency assessment, including developing the various documents and sourcing feedback from nursing homes during development phase of the resource pack and standardised policy. A proportion of the money was spent on the training programme including venue, course materials, specialist speakers and materials for the practical session.

It is difficult to conclude any financial benefits from this project, particularly as our assumptions surrounding the impact of syringe pumps on transfers of care have been proven as incorrect. During this 12-month project there have been no delayed transfers of care contributing to hospital or hospice length of stay and no unplanned hospital admissions specifically relating to a failure of EoLC. The twelve residents who died in the nursing homes represent a potential saving of £41,040.
based on the assumption of preventing an unplanned admission to hospital by enabling them to die in the care home (£3420 per admission).

6.0 Key learning and recommendations

The use of syringe pumps

- The use of syringe pumps in the nursing home population is infrequent. In this study only 2.4% of the total nursing home beds required use of this equipment over a one-year period.
- It remains unknown whether all residents, including those in ‘infrequent use homes’ are considered for continuous medication via a syringe pump, particularly if there is a degree of nervousness around the care homes ability to manage this safely and effectively. The support pathways should mitigate this situation.

Training programme and competency assessments

- Despite an intense programme of training and ongoing support, the overall percentage of RNs in nursing homes who have been assessed as competent to manage syringe pumps is <25%.
- The ability to develop both confidence and competence is determined by situational exposure and frequency of use. Competence and confidence were easier to achieve in the ‘frequent user’ homes.
- Assessing competence within nursing homes requires considerable resource to enable multiple visits and reassessments.

Other

- Staff turnover in nursing homes may impact the provision of this care element, particularly in homes with a small establishment of whole-time equivalents.
- Ensuring clear communication across all parts of the local healthcare system, particularly regarding care home support pathways out of hours.
- Ensuring there is a robust mechanism to identify care home residents who are being discharged with a syringe pump to ensure appropriate support is available to both the individual and nursing home staff.

Based on the key learning identified during this project, the following recommendations are proposed.

1. Ensure a pathway is in place (in hours and out of hours) that enables the resident’s symptoms to be managed safely via a syringe pump where appropriate by a suitably qualified individual irrespective of their place of residence. The pathway would also enable the development of skills and confidence within nursing home registered nurses through situational learning at the time of need (see section 4.2).
2. Ensure a plan is in place to offer end of life and syringe pump training to nursing home registered nurses which contributes to quality assurance
3. Supporting ‘frequent use homes’ to develop a ‘train-the-trainer’ model within their nursing establishment to ensure knowledge, skills, expertise and competence are developed and maintained.
Although this project focussed solely on end of life care and syringe pumps, similar themes have emerged within other Vanguard programme initiatives, for example, achieving and maintaining competence to insert or change a urinary catheter. An educational role specifically supporting RNs within nursing homes would provide an element of quality assurance for the local healthcare system.

7.0 Conclusion

Given the number of residents impacted by this project, competence assessment in nursing homes is not a financially viable long term solution. What has worked particularly well, both for the resident and registered nurse is the 24-hours a day pathway for advice and support regarding this important element of end of life care.

An ageing population with increasingly complex medical problems means there will be an increased need for nursing staff within nursing homes to be able to manage complex medication delivery systems, for example syringe pumps. There is therefore a need for nursing homes and their registered nursing staff to recognise the need for good end of life care and to take responsibility for providing it.

8.0 Next steps

The training offer to both nursing homes and general practice will continue indefinitely. General practice training around end of life care and syringe pumps will be offered regularly by the hospice and opportunistically by the care home support team during locality palliative care meetings. The community services provider offers syringe pump training to their community staff and this will be offered to nursing home registered nurses. The 24-hour support pathways facilitated by the community provider will continue for nursing homes and their residents. The nursing homes in Sutton will be re-audited in the next few months to reassess their provision of end of life care using a syringe pump.

9.0 References


### 10.0 Appendices

A. Baseline audit of nursing homes

B. Outline of study day

C. Competency assessment document

D. 24-hour pathways of support
   - High use homes
   - Low use homes

E. Contents of resource folder

F. Standard operating procedure for McKinley T34 syringe pump
Appendix A: Audit surrounding use of McKinley T34 syringe pump in Sutton Nursing Homes. June 2016

Sutton Clinical commissioning group was awarded funding from Health Education England (South London) to initiate a training programme for nursing home staff on the safe and effective use of syringe pumps to support residents at the end of life. In order to effectively evaluate the impact and outcomes from this training, a baseline audit of current practice in nursing homes was undertaken by the supportive care home team. There are many myths surrounding the use of syringe pumps for end of life care in nursing homes and the purpose of the audit was to identify and quantify the following areas of practice:

- Staff training and competence in using the syringe pump and managing the resident’s symptoms
- Use of the syringe pump in the last year including reasons for use, any identified issues and sources of support
- Availability of equipment, consumables and documentation

Nursing homes and registered nursing staff

There are 17 registered nursing homes (NHs) in Sutton with a total of 527 beds. The audit was conducted during June 2016 and 16 Nursing homes participated in the audit of current practice. Of the 17 NHs, six are more commonly used by the continuing healthcare team to facilitate ‘fast-track’ palliative care discharges.

The total number of substantive registered nurses (RNs) across the 16 homes is 113. Several homes reported permanent bank staff but these have not been included when analysing the audit data due to their potential transience.

Use of the syringe pump in practice

In the last calendar year, the McKinley syringe pump has been used 4 times, once in 4 different nursing homes. In a population of 527 beds, this represents <1% of the total nursing home residents in Sutton requiring use of this equipment. In each case, the need for a syringe pump was recognised by either a nurse from the home or a clinical nurse specialist and the reason cited for use in all cases was pain management. The time that the syringe pump was required for ranged between 3 days to 9 months and in each case, the syringe pump was stopped when the resident died. Three cases were managed easily and effectively in the homes. The fourth case had difficulties with both the equipment and the resident’s symptom control, and additional support was sourced from the hospice team, supportive care home team and the company itself to resolve these.

Six NHs had their own syringe pump (37%) although only one could evidence the pump had been serviced in the last year. All six homes stocked all required consumables for safe use however only 4 had specific documentation for use (25%), suggesting 2 nursing homes were only partially prepared for using the syringe pump safely. 12 nursing homes (75%) had no documentation available and 10 homes had neither the equipment nor consumables available.
Training on the T34 McKinley syringe pump and competence in use

Across the 16 nursing homes, 24% of RNs had received training on the syringe pump; however the majority of these RNs had received training more than 1 year previously. 74% of training was provided by the local hospice, 7% from the acute hospital Trust and 18% from ‘other’. No NHs had sourced training directly from the company (McKinley) and only one NH reported their RNs had received yearly updates regarding this equipment.

In individual homes, the percentage of RNs who had been trained ranged from 0-100%. Eight NHs reported they had no staff trained on the syringe pump and the reason cited for this was that they had never needed to use it.

For the eight homes whose staff had received training, the overall percentage of staff trained ranged from 12%-100%. For five of these homes, all of the staff who had received training were deemed to be competent in all 3 areas of practice; to set-up the pump, to monitor it safely and to monitor the residents’ response. One home reported 85% of staff were competent, with support required by the other RN to achieve competence. One home reported competence to monitor the pump and resident but not to set it up and one home reported they would need refresher training in order to be fully competent.

Summary by home

<table>
<thead>
<tr>
<th>NH</th>
<th>T34 RNs</th>
<th>T34 Trained RNs</th>
<th>T34 RNs competent in all 3 areas?</th>
<th>Pump + consumables used</th>
<th>Documentation used</th>
<th>Used pump in last year?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2/8</td>
<td>25%</td>
<td>Yes</td>
<td>Yes</td>
<td>Hospice</td>
<td>X1</td>
</tr>
<tr>
<td>2</td>
<td>4/14</td>
<td>28%</td>
<td>Yes</td>
<td>Yes</td>
<td>Other</td>
<td>X1</td>
</tr>
<tr>
<td>3</td>
<td>7/7</td>
<td>100%</td>
<td>Yes</td>
<td>6/7 85%</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5/7</td>
<td>71%</td>
<td>Yes</td>
<td>Yes</td>
<td>Other</td>
<td>X1</td>
</tr>
<tr>
<td>5</td>
<td>0/5</td>
<td>N/A</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>3/9</td>
<td>33%</td>
<td>No- set-up</td>
<td>Yes</td>
<td>Hospice</td>
<td>X1</td>
</tr>
<tr>
<td>7</td>
<td>3/5</td>
<td>60%</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>2/4</td>
<td>50%</td>
<td>No- update needed</td>
<td>No</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>0/8</td>
<td>N/A</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0/5</td>
<td>N/A</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1/8</td>
<td>12%</td>
<td>Yes</td>
<td>No</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>0/8</td>
<td>N/A</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>0/4</td>
<td>N/A</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>0/7</td>
<td>N/A</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>0/4</td>
<td>N/A</td>
<td>Yes</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>0/10</td>
<td>N/A</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Declined audit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix B: End of life care and syringe pump training study day

This one day course includes both theory and practical sessions to ensure that nurses not only know how to manage a syringe pump but also understand the rationale behind when to use it and the medications used.

The day will encompass:

- Managing common palliative care symptoms
- Overview of medications used including
  - indication for use
  - common side effects
  - conversions
  - calculations
- Introduction to the McKinley syringe pump
  - Rationale for using a syringe pump
  - Common problems encountered with a syringe pump e.g. site reactions, crystallisation
  - Setting-up and monitoring
  - Additional equipment needed
- Best practice in end of life care
  - London Cancer Alliance documentation
  - Nursing care plans
  - Communication of care

Training on the day will involve a combination of interactive teaching methods. This study day has been designed and delivered in partnership with St. Raphael's hospice and the Care Home Support Team (Sutton Community services).

This training is part of a Sutton-wide initiative to enhance the knowledge and skills of nursing staff in Nursing homes to provide excellence in end of life care for their residents.

It is recognised that syringe pumps may not be used frequently in the nursing home and therefore maintaining the skills and knowledge to manage this equipment safely can be a challenge. However, every resident has the right to have their symptoms well controlled, to remain in their preferred place of residence (the nursing home) and receive good end of life care.

Registered nurses (RNs) should receive training regarding best practice to address the 5 priorities of care for the dying person. In addition, they should receive training on the use of the McKinley T34 syringe pump including indications for use, medications used in the pump and the practicalities of setting up a pump safely. The McKinley T34 is classified as a high-risk medical device and therefore RNs should attend regular updates to ensure they have the knowledge and skills to continue to manage both the equipment and resident safely.

RNs need to demonstrate competence within 3-6 months following initial training. In Sutton, the supportive care home team can assist the registered manager to ensure that all RNs within the home have achieved competence, and maintain competence in this important area of care.
Appendix C: Competency Assessment Document

Syringe Pump Competency Assessment for Registered Nurses in Care Homes

This competency assessment is concerned only with the skills and knowledge required to commence and monitor a McKinley syringe pump.

Name of Nurse: .................................................................
Assessor Name: .......................................................... Title: ..............................................................
Care Home: .................................................................
Training course attended & Date: ..........................................
Syringe Pump Policy given .............................................

Written in collaboration with Sutton Community Health Services, St Raphael’s Hospice and Sutton Clinical Commissioning Group
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Core Knowledge Criteria</th>
<th>Formative assessment</th>
<th>Summative assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>The specific knowledge being assessed in relation to the competency field.</td>
<td>The specific knowledge you would expect to be explained to the assessor in relation to the outcome.</td>
<td>Date &amp; sign</td>
<td>Date &amp; sign</td>
</tr>
<tr>
<td>(1) Demonstrates an understanding of the NMC Standards for medicine management, in accordance with the local Policy, standards and procedure.</td>
<td>Discusses the ‘9 rights’ of medicine management</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>Has the knowledge and understanding of Care Home Medicine Management Policy</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>Has an awareness of the potential risks of single nurse administration and how these risks can be minimised or avoided</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>Can identify the indications for using a syringe pump</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>Identify and explain what actions must be taken in the event of a drug error</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>Correctly identifies which infusion sets and cannula are used for subcutaneous route</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>(2) Demonstrates clinical knowledge of the medicines commonly used in palliative care</td>
<td>Demonstrates an understanding of the appropriate use, appropriate dose, potential side effects and compatibility of the following medications:</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>- Metoclopramide</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>- Hyoscine Butylbromide</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>- Midazolam</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>- Glycopyronium</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>- Hyoscine Hydrobromide</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>- Oxycodone</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>- Diamorphine</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>- Morphine</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>- Alfentanil</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>Is able to competently convert oral doses of opioids to the subcutaneous route</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>Can identify 3 sources of advice when there are queries regarding symptom control</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Outcome</td>
<td>Core Knowledge Criteria</td>
<td>Formative assessment</td>
<td>Summative assessment</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>----------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>The specific knowledge being assessed in relation to the competency field.</td>
<td>The specific knowledge you would expect to be explained to the assessor in relation to the outcome.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| (3) Demonstrates knowledge and understanding about the documentation required to ensure safe administration of medications using a syringe pump | • Demonstrates a sound knowledge and understanding of the London Cancer Alliance (LCA) documentation and can accurately demonstrate its use  
• Can state how often the syringe pump checklist must be completed |                      | NB only one summative can occur                 |
| (4) Demonstrates the knowledge and understanding to safely maintain and care for the syringe pump in accordance with Manufacturer recommendations | • Explains how often the syringe pump requires servicing and how to arrange this  
• Explains how to check when a syringe pump was serviced last  
• Explains how and when to clean the syringe pump  
• Explains what actions to take in the event of an infusion error or device failure |                      | NB only one summative can occur                 |
| (5) Demonstrates the knowledge and understanding of how to troubleshoot the most common problems with the syringe pump | • Is able to identify the appropriate actions to be taken if the following occurs:  
  - The syringe pump does not start  
  - The infusion does not run to time  
  - The syringe pump has stopped before the end of the infusion  
  - The cannula site requires frequent changes |                      | NB only one summative can occur                 |
<p>| (6) Demonstrates effective | • Clearly explains the procedure to patient/carers |                      | NB only one summative can occur                 |</p>
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Core Knowledge Criteria</th>
<th>Formative assessment</th>
<th>Summative assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>The specific knowledge being assessed in relation to the competency field.</td>
<td>The specific knowledge you would expect to be explained to the assessor in relation to the outcome.</td>
<td>Date &amp; sign</td>
<td>Date &amp; sign</td>
</tr>
</tbody>
</table>
| preparation of the patient to ensure informed consent is gained | and gains consent  
- Identifies a suitable site to insert subcutaneous cannula  
- Checks any existing cannula site for signs of erythema, induration, swelling and pain  
- Is able to state how often the extension set/cannula should be changed | | |

(7) Prepares any medication in accordance with the NMC Standards for medicine management, and the Care Home Policy, standards and procedures

<table>
<thead>
<tr>
<th>Core Knowledge Criteria</th>
<th>Formative assessment</th>
<th>Summative assessment</th>
</tr>
</thead>
</table>
| | Demonstrates the ability to check and record medication stock balance  
- Confirms patient details including allergy status  
- Undertakes effective infection control measures  
- Prepares the medication safely and accurately in accordance with the care home policy and guidelines  
- If required, primes the infusion line and applies the clamp for safety  
- Correctly completes and attaches an additive label to the syringe to denote contents | | NB only one summative can occur |

(8) Demonstrates safe preparation and set up of the syringe pump prior to use

<table>
<thead>
<tr>
<th>Core Knowledge Criteria</th>
<th>Formative assessment</th>
<th>Summative assessment</th>
</tr>
</thead>
</table>
| Checks the syringe pump to confirm that the date of last service is within the last 12 months  
Inserts the battery and checks the percentage of battery life remaining  
Can identify when a battery needs replacing  
Is able to demonstrate how to load the syringe onto the syringe pump  
Can safely commence the infusion and confirm that it is running  
Can demonstrate and explain how to check the | | NB only one summative can occur |
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Core Knowledge Criteria</th>
<th>Formative assessment</th>
<th>Summative assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>The specific knowledge being assessed in relation to the competency field.</td>
<td>The specific knowledge you would expect to be explained to the assessor in relation to the outcome.</td>
<td>Date &amp; sign</td>
<td>Date &amp; sign</td>
</tr>
<tr>
<td></td>
<td>volume to be infused and the actual volume infused</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Can demonstrate how to apply and remove the keypad lock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(9) Demonstrates the ability to check that the syringe pump is functioning correctly</td>
<td></td>
<td></td>
<td>NB only one summative can occur</td>
</tr>
<tr>
<td></td>
<td>• Completes the checklist accurately at each visit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Knows what actions to take if there are adverse findings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Knows how to escalate any concerns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10) Demonstrates consideration of the ongoing needs of a patient requiring a syringe pump</td>
<td></td>
<td></td>
<td>NB only one summative can occur</td>
</tr>
<tr>
<td></td>
<td>• Checks stock balance of equipment, medications and documentation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ensures that further supplies of the above are supplied in a timely manner</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Refers patient to appropriate members of the multidisciplinary team (ie: Supportive Care Home Team, St Raphaels &amp; Community Nurses) when assessed as necessary</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### FORMATIVE COMMUNICATION LOG

<table>
<thead>
<tr>
<th>Date &amp; time</th>
<th>Formative assessment comments</th>
<th>Action plan</th>
<th>Designation &amp; Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SUMMATIVE COMMUNICATION LOG

<table>
<thead>
<tr>
<th>Date &amp; time</th>
<th>Summative assessment comments</th>
<th>Action plan</th>
<th>Signature and designation of Assessor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Action Plan

<table>
<thead>
<tr>
<th>Date &amp; time</th>
<th>Action Plan</th>
<th>Designation</th>
<th>Signature of Practitioner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Competency Declaration

To be signed by the practitioner once they have successfully completed the whole competency and deemed safe by assessor to practice independently

I feel competent to independently manage syringe pumps

Practitioner Signature: .................................................................Name: ..................................................... Date: ........................................

I have observed .................................................................and consider them competent to manage syringe pumps

Assessor Signature: .................................................................Name: ..................................................... Date: ........................................

(Please retain original for your Personal Development File and photocopy for the Assessor)
Appendix D: Pathways of support for nursing homes

Pathway for management of EoLC Syringe Pumps in Sutton Nursing Homes (NH)

Frequent user homes

1. NH identifies resident is reaching EoL (SCHT / CHC / St Raphael’s Hospice support this process as needed)

2. EoL Care Plan initiated
   - NH arranges medication with GP (order, collect & stored for when needed)
   - Syringe pump authorisation documents initiated

3. Exclude other causes for resident's symptoms (use individualised care plan for guidance)

4. Recognise NH resident's symptoms are worsening

5. Use FRN medications for minimum 24hrs. Liaise with SCHT / St. Raphael's hospice for advice to proceed to pump

6. NH uses own pump

7. Pump set-up, SCHT informed pump in use. NH monitors resident response to ensure continued appropriate use.

8. ScHt - Supportive Care Team: 0776 924 8758
   St. Raphael's CNS: 010 8099 7777
   DN on call via Royal Marsden: 020 8642 6011
   CHC - Continuing Health Care: SUTCGG.ContinuingCare@nhs.net

9. NH use contact sheet for any subsequent issues
Pathway for management of EoLC Syringe Pumps in Sutton Nursing Homes (NH)

Less frequent user homes

- NH and SCHT/CHC/St Raphael’s Hospice identify resident is reaching EoL
- Initiate EoL Care Plan in discussion with GP/SCHT/St Raphael’s Hospice
- NH arranges medication with GP (order, collect & stored for when needed)
- Syringe pump authorisation documents initiated
- Use PRN meds
- Exclude reversible causes
- Recognise NH resident’s symptoms are worsening
- Liaise with St Raphael’s Hospice/SCHT for advice to proceed to pump

Mon – Fri (9am to 5pm)

NH contact SCHT
NH collect pump and complete documentation of loan
SCHT visit & setup pump with RN
SCHT refers to St Raphael’s Hospice/DN OoH in case needed
NH manage patient & pump with regular review by SCHT

Pump required (how to access)

Mon – Fri (Out of Hours or weekends)

NH contact DN on call Telephone number
DN visits & sets up pump, NH to complete documentation of loan
DN refers to St Raphael’s and informs SCHT/CHC/for Mon – Fri follow up
NH manage patient & pump with regular reviews and support by SCHT
NH use contact sheet for any subsequent issues

SCHT: Supportive Care Home Team: 07765248755
St Raphael’s: DNS: 010 3069 7777
DN on call via Royal Marsden: 020 8642 6011
CHC: Continuing Health Care: SUTCCG.Continuingcare@nhs.net
Appendix E: Contents of Resource folder for nursing homes

Introduction

Resident Pathways

- Pathway for management of EoLC Syringe Pumps in Sutton Nursing Homes – Frequent User Homes
- Pathway for management of EoLC Syringe Pumps in Sutton Nursing Homes – Less Frequent User Homes
- Sources of support and further information

Equipment and Documentation

- Standard Operating Procedure
- Approved documentation
  - Guidelines when using syringe pump community charts
  - Infusion Administration Record & Checklist
  - PRN Drug Authorisation & Administration Record
  - Subcutaneous Syringe Pump Drug Authorisation Chart
  - Controlled Drug Stock Balance Chart
  - Non-controlled Drug Stock Balance Chart
- Consumables List (Single-use equipment)
- Pharmacy List to source palliative care medication
- Loan / Return Agreement for borrowing a syringe pump from Community Services

Training and Education

- Information on staff training and development of competence
- Syringe Pump Competency Assessment for Registered Nurses in Care Homes
- Information on staff training and development of competence
- Syringe Pump Competency Assessment for Registered Nurses in Care Homes
Appendix F: Standard Operating Procedure for

Standard Operating Procedure (SOP) for use of Syringe Pumps (McKinley T34) in Nursing Homes in Sutton

Through the Sutton Care Home Vanguard Partnership: This document has been developed to support Registered Nurses working in Nursing Homes to safely and effectively manage the use of syringe pumps to meet their residents’ palliative care needs. This document has been endorsed as best practice in the use of this medical device by The Royal Marsden Hospital Foundation Trust, The Royal Marsden Community Services and St. Raphael’s Hospice. The provision of safe, effective and accountable care remains the overall responsibility of the nursing home provider and the individual NMC registered nurses employed by the provider.

Sutton Homes of Care Vanguard
27th September 2016

Adapted with Permission from The Royal Marsden Foundation Trust- Sutton Community Services and St Raphael’s Hospice Syringe Pump Policies, in collaboration with Sutton Clinical Commissioning Group
Version 5: Endorsed at The Royal Marsden Nursing, Rehabilitation & Radiography Advisory Committee (NRRAC) 12th September 2016, for review September 2018.
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Summary and Purpose</td>
<td>2</td>
</tr>
<tr>
<td>2.0 Introduction</td>
<td>2</td>
</tr>
<tr>
<td>2.1 Indications for Use</td>
<td>2</td>
</tr>
<tr>
<td>2.2 Assessing the best site for subcutaneous drug infusions</td>
<td>3</td>
</tr>
<tr>
<td>2.3 Care of the Subcutaneous site</td>
<td>3</td>
</tr>
<tr>
<td>2.4 Choice of cannula</td>
<td>3</td>
</tr>
<tr>
<td>3.0 Set-up and administration of medications via the McKinley T34 syringe pump</td>
<td>4</td>
</tr>
<tr>
<td>3.1 Key features</td>
<td>4</td>
</tr>
<tr>
<td>3.2 Syringe Size and Type</td>
<td>4</td>
</tr>
<tr>
<td>3.3 Priming the extension set</td>
<td>5</td>
</tr>
<tr>
<td>3.4 Equipment required</td>
<td>5</td>
</tr>
<tr>
<td>3.5 Procedure for setting-up the first infusion</td>
<td>5</td>
</tr>
<tr>
<td>3.6 Procedure for setting-up subsequent infusions</td>
<td>6</td>
</tr>
<tr>
<td>3.7 Monitoring the infusion</td>
<td>6</td>
</tr>
<tr>
<td>3.8 Changing the battery</td>
<td>7</td>
</tr>
<tr>
<td>4.0 Risk management</td>
<td>7</td>
</tr>
<tr>
<td>4.1 Reporting incidents</td>
<td>7</td>
</tr>
<tr>
<td>4.2 Alarm Conditions</td>
<td>8</td>
</tr>
<tr>
<td>5.0 Prescriptions for syringe pumps in care homes</td>
<td>9</td>
</tr>
<tr>
<td>6.0 Approved documentation</td>
<td>9</td>
</tr>
<tr>
<td>6.1 Subcutaneous Syringe Pump Drug Authorisation Chart</td>
<td>9</td>
</tr>
<tr>
<td>7.0 Decontamination and storage</td>
<td>9</td>
</tr>
<tr>
<td>8.0 Troubleshooting</td>
<td>10</td>
</tr>
<tr>
<td>9.0 References and Appendices</td>
<td>11</td>
</tr>
<tr>
<td>Appendix 1- Drug and diluent compatibility</td>
<td>12</td>
</tr>
<tr>
<td>Appendix 2- Information for residents and carers</td>
<td>13</td>
</tr>
</tbody>
</table>
1.0 Summary and Purpose

This document pertains to the safe prescription and administration of subcutaneous medications, administered continuously via the McKinley T34 syringe pump. It provides detailed information on indication for use, how to set-up an infusion, required monitoring and associated documentation. This document is for use by registered nurses working within Nursing homes in Sutton, registered with a Sutton GP.

This document pertains to the safe administration of **subcutaneous drugs** to support the effective symptom control management for palliative care adults in Sutton nursing homes.

The aim is to ensure the best management of each resident’s disease and symptoms. At times this may involve the administration and continuous subcutaneous delivery of medicines via a syringe pump to patients who are unable to tolerate oral medication for any reason. This may be for a short period of time or until death occurs. Continuous subcutaneous infusions via syringe pumps facilitate the mixing of more than one medication to treat different symptoms and avoid the peaks and troughs of medication levels in plasma that occur with intermittent injections.

**If the practitioner is unfamiliar with the use of the syringe pump, he/she should seek expert advice and refer to their NMC Code of Conduct.**

Further information about the McKinley T34 syringe pump is also available in the syringe pump resource folder in your care home.

A resident and family information sheet regarding the syringe pump can be found in Appendix 2.

2.0 Introduction to using the McKinley T34 pump

The McKinley T34 syringe pump is a portable battery operated infusion pump. It is set up to deliver the syringe contents by subcutaneous infusion over a 24 hour period. The syringe pump will automatically calculate the rate of administration according to the volume in the syringe.

2.1 Indications for Use

- Nausea and vomiting
- Dysphagia
- Severe weakness
- Confusion or delirium
- Diminishing level of consciousness
- Bowel obstruction
- Uncontrolled pain
2.2 Assessing the best site for subcutaneous drug infusions

The following points should be considered when assessing the best site for subcutaneous drug infusions:

- There should be a reasonable amount of subcutaneous tissue available for insertion of the cannula
- The patient's needs and preferences should be taken into account
- The siting of the device should not interfere with mobility
- Infusions should never be established on bony prominences, near local infections, broken or irradiated areas of skin, skin folds, oedematous limbs and where there is evidence of skin problems due to malignancy.

Common and/or preferred sites include:

- Upper arms
- Upper thighs
- Abdomen
- Upper chest wall
- Between shoulder blades

2.3 Care of the Subcutaneous Site

In the care home setting, the site of infusion should be checked at least every 4 hours for:

- Pain/discomfort
- Swelling/induration
- Erythema
- Leakage of fluid
- Bleeding

If a problem occurs, the cannula should be immediately re-sited in a different location and the reason documented.

2.4 Choice of cannula

The administration of all subcutaneous infusions should be via a BD Saf-T-Intima (without Y adapter) straight yellow 24 G. If breakthrough injections are required a second Saf-T-Intima without Y-adapter device should be sited.

The cannula, once inserted subcutaneously, should be secured with a clear occlusive dressing. If no problems develop, the BD Saf-T-Intima cannula and site can be changed every 5 to 7 days.
3.0 Set-up and administration of medications via the McKinley T34 syringe pump

3.1 Key features of the pump

The McKinley T34 syringe pump is calibrated in **mils per hour**. The pump has a syringe barrel clamp arm securing the syringe in place. The pump has an LCD display giving information about the infusion. The pump settings are locked so that the user cannot change the default duration (24 hours) and the pump delivers the full contents of the syringe over this period of time.

3.2 Syringe Size and Type

The pump has a 3-point syringe detection feature (clamp sensor, syringe flange sensor and plunger sensor) enabling the pump to detect all commonly used syringe sizes and brands. This feature enables the pump to automatically make volume and rate calculations, thereby reducing the risk of user error. The sensors also activate an alarm if the syringe is removed or partially displaced during infusion.

The pump automatically identifies the brand of syringe once it has been loaded onto the pump. During set-up, the user must check carefully that the pump has correctly identified the brand and size of syringe being used:

<table>
<thead>
<tr>
<th>BD Plastipak Luer Lock syringe size</th>
<th>Volume to be drawn up</th>
<th>Approximate rate/hour (these may vary slightly)</th>
<th>Approximate rate/hour (when infusion extension set is primed with 0.8ml)</th>
<th>Availability of locked box for syringe size</th>
</tr>
</thead>
<tbody>
<tr>
<td>20ml</td>
<td>17ml</td>
<td>0.71ml/hr</td>
<td>(16.2ml) 0.68ml/hr</td>
<td>Yes</td>
</tr>
<tr>
<td>30ml</td>
<td>22ml</td>
<td>0.92ml/hr</td>
<td>(21.2ml) 0.88ml/hr</td>
<td>No</td>
</tr>
<tr>
<td>50ml</td>
<td>32ml</td>
<td>1.33ml/hr</td>
<td>(31.2ml) 1.3ml/hr</td>
<td>No</td>
</tr>
</tbody>
</table>

3.3 Priming the Extension set

The extension set is primed manually **before** the syringe is loaded onto the syringe. It is not necessary to prime the Saf-T-Intima cannula as it has a dead space of only 0.2ml. The pump will then calculate the remaining volume in the syringe over the 24hrs duration. This means that for the first infusion the patient will receive slightly less than the prescribed dose of medication (syringe volume minus extension set volume).
3.4 Equipment required

- McKinley T34 Syringe pump and holster
- A 9V alkaline battery
- Relevant medication and diluent
- Needles and syringes
- Sharps container
- Saf-T-Intima cannula
- Extension set with anti-siphon valve
- Alcohol wipe with 2% chlorhexidine and 70% alcohol
- Clear adhesive dressing e.g. Tegaderm
- Luer lock BD Plastipak syringe
- Syringe pump prescription, recording sheet, label

3.5 Procedure for setting-up the first infusion

1. Choose an appropriately sized luer-lock syringe for volume of drugs needed
2. Draw up medications as prescribed and the appropriate diluent to a volume of 17mls, 22mls or 32mls depending on whether the syringe is a 20ml, 30ml or 50ml size respectively. See appendix 1 for drug diluent and compatibility.
3. Label the syringe (ensuring label does not obscure scale on syringe).
4. Prime the extension set of the selected administration.
5. Install the battery into McKinley pump.
6. Ensure that the barrel clamp arm is down.
7. Press and hold the ‘on/off’ key until the ‘self-test’ screen appears. The LCD display will show ‘PRE LOADING’ and the actuator will start to move (The actuator is returning to the start position of the last infusion programmed). Wait until it stops moving and the ‘LOAD SYRINGE’ flashing screen appears.
8. If the actuator is not in the required position to accommodate the syringe, leave the barrel clamp arm down and use the ‘FF’ or ‘Back’ key to move the actuator to the required position. Forward movement of the actuator is limited for safety reasons so repeated presses of the ‘FF’ key may be needed. Backward movement is not limited.
9. Press the ‘Info’ key and (if necessary) use the + or – keys to scroll through the info menu until the battery check facility is displayed. Press the ‘Yes/start key’ to select and check that the battery life is adequate. If there is less than 10% battery life remaining press the ‘No/Stop’ key to stop the pump and change the battery.
10. Assuming the battery life is satisfactory, wait and after approximately 10 seconds the screen will revert to the ‘LOAD SYRINGE’ graphic.
11. Lift the barrel clamp arm. Load the syringe into the pump, seating the syringe collar and plunger simultaneously.
12. Lower the barrel clamp arm to sit on top of the barrel. If the syringe is correctly loaded the on screen graphic will stop flashing and the pump will display the size and brand of syringe.
13. Check the LCD display to ensure that the pump has correctly identified the size and brand of syringe. Press ‘Yes’ to confirm or, if incorrect, use the ‘+’ or ‘-’ keys to scroll through the different syringe brands. Press ‘Yes’ to select the correct brand.
14. The pump calculates and displays the deliverable volume, duration of infusion (24 hours) and rate of infusion.
15. Mentally check that the infusion rate is as expected (e.g. 0.71mls/hr for a 20ml syringe) and press ‘Yes’ to confirm. The LCD display shows ‘START INFUSION’.
16. Site the Saf-T-Intima cannula and secure with a clear adhesive dressing.
17. Press ‘Yes’ to start the infusion.
18. Once the infusion is running the pump screen displays:

**The infusion duration**

The infusion rate in mls/hour

**Syringe size and brand alternating with “pump delivering”**

**The green LED light flashes**

19. Press and hold the ‘Info’ key to activate the keypad lock. The screen displays ‘Keypad lock’ with a progress bar moving from left to right. Hold the key until the bar reaches the right end of the screen and the pump bleeps to confirm the lock is on.
20. Record relevant information on the ‘syringe pump infusion administration record and check sheet’ (these can be found in your care home syringe pump resource folder).

### 3.6 Procedure for setting-up subsequent infusions

1. Draw up drugs as above.
2. Stop the infusion by pressing the red ‘Stop/No’ and then switch the pump off using the ‘On/Off’ key, waiting for the progress bar to travel from left to right and the bleep that indicates the pump is completely off.
3. Disconnect the empty or nearly empty syringe from the pump and ensure the barrel clamp arm is down.
4. Load the new syringe as above.
5. Disconnect the empty/nearly empty syringe from the extension set and connect the new syringe.
6. Start the infusion and activate keypad lock as above.

This method ensures that the full syringe is loaded safely onto the pump before being connected to the patient and therefore reduces the risk of accidentally plunging the syringe contents into the patient.

### 3.7 Monitoring the infusion

Progress of the infusion should be checked at least every **4 hours** using the ‘syringe pump infusion administration record and check sheet’ (these can be found in your care home syringe pump resource folder).
The following checks should be made:

- Check the site for signs of inflammation (see section 2.3 above).
- Calculate that the ‘volume infused’ and ‘volume to be infused’ are correct. To do this, press the ‘Info’ key once. This displays the volume to be infused (VTBI) and the volume already infused (VI).
- Check the battery is sufficient. To do this, press the ‘Info’ key twice in quick succession to display the remaining battery life. Stop the infusion and change the battery if the battery life is less than 10% (see section 3.8 below).
- Visually check the medication solution in the syringe remains clear and colourless.

3.8 Changing the battery

In order to change the battery there will be temporary interruption of the infusion. The following process applies:-

1. Press the red ‘Stop/No’ key
2. Change the battery
3. Turn pump on.
4. Screen briefly shows the “load syringe” graphic. It then requests confirmation of syringe size and brand. Press ‘Yes’ to confirm
5. The screen now displays “Press YES to resume or No for new program’. **Press ‘Yes’ to resume program.** (If ‘No’ is pressed the pump will interpret it as a completely new 24hr period and will recalculate a new rate according to the remaining mls left in the syringe. This will result in under-dosing the patient)

4.0 Risk Management

Care must be taken to ensure that the McKinley T34 syringe pump is not immersed in water. It should also be kept away from mobile telephones to avoid the risk of electromagnetic interference. Syringe pumps must be serviced yearly or following any potential damage, e.g. dropping onto the floor.

Syringes containing combinations of drugs should be kept away from direct sunlight and excessive heat.

The nurse setting-up, using and monitoring the McKinley T34 syringe pump must be **competent** in the use of this equipment. This includes knowledge and understanding of indications for use, medications administered via a syringe pump, potential risks to the resident and their legal and professional responsibilities when using this device. A copy of the ‘syringe pump competency assessment for registered nurses in care homes’ is available in your care home syringe pump resource folder.

4.1 Reporting incidents

As with any piece of equipment, there is potential for the resident to be harmed due to either equipment malfunction or user-error. Both would be classed as a patient safety incident. This is any unintended or unexpected incident that occurs in respect of a resident, during and as a result of the provision of the Services, that could have
led, or did lead to, harm to that resident. A medication error is defined as any patient safety incident where there has been an error in the process of prescribing, preparing, dispensing, and administering, monitoring or providing advice on medicines.

Any incidents resulting from use of the McKinley syringe pump that have impacted on resident safety must be reported to the Care Quality Commission via the ‘provider portal’. If the incident is due to equipment failure, the equipment provider must be informed immediately and a new pump sourced to ensure the resident’s symptoms continue to be managed appropriately.

Any incidents resulting from using the McKinley syringe pump must also be discussed with the resident and their next of kin under the legal requirements of ‘Duty of Candour’.

4.2 Alarm conditions

When the pump detects a problem, four things occur:
1. The infusion stops
2. An audible alarm is activated
3. A message appears on the display screen indicating the cause of the alarm
4. The LED indicator turns red

There are seven possible alarms. The following table indicates the appropriate action for each situation:

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Probable Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occlusion/Syringe Empty</td>
<td>Administration set blocked</td>
<td>Replace administration set, re-site and resume infusion</td>
</tr>
<tr>
<td></td>
<td>Tubing occluded (kinked or trapped)</td>
<td>Clear the occlusion</td>
</tr>
<tr>
<td></td>
<td>Actuator has reached minimum travel position</td>
<td>Turn pump off</td>
</tr>
<tr>
<td>Syringe Displaced</td>
<td>One or more of syringe detection sensors is not detecting the syringe due to syringe being removed or displaced</td>
<td>Check syringe and reseat as necessary</td>
</tr>
<tr>
<td>Pump Paused Too Long</td>
<td>Programming not completed and/or pump left in ‘stop’ mode with no keypad presses detected for 2 minutes</td>
<td>Start the infusion, continue programming or turn pump off if not needed</td>
</tr>
<tr>
<td>Alarm</td>
<td>Probable Cause</td>
<td>Action</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Near End</td>
<td>Infusion will end in approximately 40-45 minutes</td>
<td>Prepare to change the syringe or turn pump off if not needed</td>
</tr>
<tr>
<td>End Program</td>
<td>Infusion is complete</td>
<td>As above</td>
</tr>
<tr>
<td>Low battery</td>
<td>Battery is almost depleted (30 minutes left)</td>
<td>Prepare to change battery</td>
</tr>
<tr>
<td>End battery</td>
<td>Battery is depleted</td>
<td>Change battery</td>
</tr>
</tbody>
</table>

### 5.0 Prescriptions for syringe Pumps in care homes

In Sutton Care Homes, the prescription for the drug(s) to be included in the syringe pump should be written on the London Cancer Alliance Drug Authorisation chart for Syringe Pump Chart by the prescriber. This is usually the patient’s GP or it may be the community or hospital palliative care team.

The drugs should be written in the boxes to indicate the symptom they are being prescribed to manage. If a patient’s needs change, then the Drug Authorisation Chart must be scored out and rewritten. Alterations are not permitted.

### 6.0 Approved documentation

The approved documents for use in the community setting, including care homes are:

- Subcutaneous Syringe Pump Drug Authorisation Chart
- As required (prn) drug authorisation and administration record
- Subcutaneous T34 Syringe Pump Infusion Administration Record and Checklist
- Controlled Drug Stock Balance Chart
- Non-Controlled Drug Stock Balance Chart

A paper copy of each of these documents can be found in your care home syringe pump resource folder.

#### 6.1 Subcutaneous Syringe Pump Drug Authorisation Chart

All Drug Authorisation Charts for Syringe Pumps used must be written and signed by the prescriber (General Practitioner/ hospital / hospice doctor).

Emphasise with prescribers/authorisers it is best practice to assess the patient’s symptom control needs before implementing a care plan. Ensure that oral medication has been discontinued as appropriate. Ensure that PRN medication has been prescribed.

Always consult GP or Nurse Specialist if not 100% sure about medication: it could be simply to check that your decision is correct.

If Syringe Pump is in situ always refer to the administration check list regarding the current content.
7.0 Decontamination and storage

When the pump is no longer required, it must be cleaned and returned.

- Decontaminate the pump using disposable detergent wipes
- Remove the battery, replace battery cover
- Ensure barrel clamp arm is in the down position

The pumps should be returned to Sutton Community Health Services through liaison with the care home support team.
If the pump belongs to the care home, it must be serviced yearly to ensure it continues to function correctly.

8.0 Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The syringe pump will not start</td>
<td>No battery</td>
</tr>
<tr>
<td></td>
<td>Battery inserted the wrong way around</td>
</tr>
<tr>
<td></td>
<td>Flat battery</td>
</tr>
<tr>
<td></td>
<td>Malfunction of motor</td>
</tr>
<tr>
<td>Infusion stopped or alarm sounded</td>
<td>Empty syringe – actuator at end of travel</td>
</tr>
<tr>
<td></td>
<td>Inflamed injection site</td>
</tr>
<tr>
<td>Infusion ended early/pump going too quickly</td>
<td>Incorrect rate setting</td>
</tr>
<tr>
<td></td>
<td>Wrong syringe brand confirmed during set-up</td>
</tr>
<tr>
<td></td>
<td>Pump faulty</td>
</tr>
<tr>
<td></td>
<td>Leakage from luer connection</td>
</tr>
<tr>
<td>Infusion taking longer time than expected</td>
<td>Pump stopped or has stopped and been restarted</td>
</tr>
<tr>
<td></td>
<td>Wrong rate set</td>
</tr>
<tr>
<td></td>
<td>Battery low</td>
</tr>
<tr>
<td></td>
<td>Occlusion of extension set</td>
</tr>
<tr>
<td>Crystallisation</td>
<td>Cyclizine or haloperidol most frequently cause a problem</td>
</tr>
<tr>
<td></td>
<td>Change the whole administration set</td>
</tr>
<tr>
<td></td>
<td>Dilute to a larger volume</td>
</tr>
<tr>
<td></td>
<td>Keep away from direct sunlight or heat</td>
</tr>
</tbody>
</table>

If the problem cannot be resolved, use the contact list in your care home syringe pump resource folder for further advice.
9.0 References


**Appendix 1 Drug and Diluent Compatibility**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Diluent #</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NaCl = 0.9% sodium chloride</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WFI = Water for Injections</td>
<td></td>
</tr>
<tr>
<td>Alfentanil*</td>
<td>0.9% NaCl / WFI</td>
<td>Analgesic</td>
</tr>
<tr>
<td>Cyclizine*</td>
<td>WFI</td>
<td>Anti-emetic</td>
</tr>
<tr>
<td>Dexamethasone*</td>
<td>0.9% NaCl / WFI</td>
<td>Steroid</td>
</tr>
<tr>
<td>Diamorphine</td>
<td>WFI</td>
<td>Analgesic</td>
</tr>
<tr>
<td>Diclofenac*</td>
<td>0.9% NaCl</td>
<td>Non-steroidal anti-inflammatory</td>
</tr>
<tr>
<td>Fentanyl*</td>
<td>0.9% NaCl / WFI</td>
<td>Analgesic</td>
</tr>
<tr>
<td>Glycopyrronium</td>
<td>0.9% NaCl / WFI</td>
<td>Control of secretions</td>
</tr>
<tr>
<td>Haloperidol</td>
<td>0.9% NaCl / WFI</td>
<td>Anti-emetic/ anti-psychotic</td>
</tr>
<tr>
<td>Hyoscine Butylbromide</td>
<td>WFI/ 0.9% NaCl</td>
<td>Anti-spasmodic</td>
</tr>
<tr>
<td>Hyoscine Hydrobromide</td>
<td>0.9% NaCl / WFI</td>
<td>Control of secretions</td>
</tr>
<tr>
<td>Ketamine*</td>
<td>0.9% NaCl / WFI</td>
<td>Analgesic</td>
</tr>
<tr>
<td>Ketorolac</td>
<td>0.9% NaCl / WFI</td>
<td>Non-steroidal anti-inflammatory</td>
</tr>
<tr>
<td>Levomepromazine</td>
<td>0.9% NaCl / WFI</td>
<td>Anti-emetic/ sedative</td>
</tr>
<tr>
<td>Metoclopramide</td>
<td>WFI/ 0.9% NaCl</td>
<td>Anti-emetic</td>
</tr>
<tr>
<td>Midazolam</td>
<td>0.9% NaCl / WFI</td>
<td>Anxiolytic/ Sedative</td>
</tr>
<tr>
<td>Morphine Sulphate</td>
<td>0.9% NaCl / WFI</td>
<td>Analgesic</td>
</tr>
<tr>
<td>Octreotide*</td>
<td>WFI/ 0.9% NaCl</td>
<td>High output of secretions/ vomiting</td>
</tr>
<tr>
<td>Oxycodone*</td>
<td>WFI/ 0.9% NaCl</td>
<td>Analgesic</td>
</tr>
</tbody>
</table>

* These drugs are particularly prone to crystallization and/or precipitation and should be monitored with particular vigilance

# Where there is a choice of diluent i.e. 0.9% Sodium chloride or Water for injections, the preferred diluent is listed first.
Appendix 2

The McKinley T34 Syringe Pump information for Care Home Residents and Carers

Introduction
This leaflet has been written to add to what you have been told by your nurse or doctor about the use of your Syringe Pump. We hope it answers some of your questions. If you require more information, please ask your nurse or doctor.

What is a Syringe Pump?
A Syringe Pump is a small, lightweight, battery operated, portable pump that gives your medication slowly and steadily over a period of time, usually 24 hours. The syringe that is connected to the Syringe Pump is filled with medication depending on your symptoms. Your medication will be reviewed on a regular basis and may be changed, if necessary.

How will the Syringe Pump be connected to me?
Liquid medication is put into a syringe and a long thin tube, with a tiny needle with a plastic tube (cannula) at the other end, is connected to it. The needle is then removed. Your nurse or doctor will insert the needle just under the skin. They will put a clear dressing over the cannula to keep it clean, dry and in place. Once the cannula is in place, you shouldn’t feel it and it can stay there for several days. The cannula is usually inserted under the skin on your chest or upper arm, although other parts of the body may be chosen for comfort or convenience.

Why do I need a Syringe Pump?
Syringe Pumps are used for several reasons. It is a simpler and more comfortable way to receive medication for people who would otherwise need repeated injections. Examples are:
Some people find it difficult to swallow their medication in tablet or syrup form
Some people may feel sick or vomit frequently which means they can’t keep their tablets in their stomach long enough for them to work
Some people’s symptoms are difficult to control by tablets alone and a syringe pump may be used as well.

What do I need to look out for?

Your skin:
Sometimes the medication in the syringe can cause a skin reaction. Your nurse will check the cannula site regularly. If the area becomes sore, the cannula may be moved to another part of your body.
If you notice any redness or swelling yourself, report it to your nurse.

The Syringe Pump:
A Syringe Pump is quite strong but can be damaged by dropping it or standing on it accidentally. Handle the pump with care.
A Syringe Pump must not get wet. Ask your nurse for advice about washing and bathing.

There is an alarm in the Syringe Pump that will bleep 45-50 minutes before completion of the infusion. At other times the alarm may sound for one of three reasons:

- There is a blockage to the flow of medication caused by a kink in the long tubing.
- The syringe is empty
- The battery is running low

You may be shown how to manage these problems. If you can’t, please contact your nurse straight away. If you don’t, you may start to become uncomfortable. A small light on the front of the Syringe Pump flashes regularly and shows that the battery and syringe pump are working. If it stops flashing, a new battery may be needed. Please contact your nurse straight away.

**Using the pump safely**
There are several keys on the Syringe Pump - DO NOT TOUCH THEM. They are for the nurse when setting up and changing the medication. The Syringe Pump must be kept in the lock box while in use.

Keep the syringe contents out of direct sunlight. They must not become too warm. Please ask your nurse for advice on the best place to keep your Syringe Pump. You can get a lightweight holder if you want to be mobile.

The nurse will complete several forms to make sure that the Syringe Pump is used safely.

**If you have questions or require more information, please ask your doctor or nurse.**