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Mitchell, Aby and Elbourne, Scott (2020) Advance care planning and syringe drivers in palliative and end-of-life care. *British Journal of Nursing*, 29 (17). pp. 1010-1015. ISSN 0966-0461

10.12968/bjon.2020.29.17.1010

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Advanced care planning and syringe drivers in palliative and end of life care

‘at a glance clinical review article for commissioned series’.

This article will:

- Provide an awareness of palliative and end of life care
- Increase knowledge on advanced care planning
- Provide clinical guidance setting up a syringe driver

Palliative and end of life care is an important aspect of nursing. Around 500,000 people die in England every year and it is expected by 2040 this will rise to 590,000 (Dying Matters, 2020). The main aetiology of death is stroke and heart failure, however one in four in the United Kingdom will die of cancer (Office for National Statistics, 2020). It should also be appraised that due to an increasing and ageing population, a significant proportion of older adults will be living with comorbidity and therefore an increase in deaths due to comorbidity and frailty will likely pertain as a leading cause of mortality in the coming years (National Institute for Health and Care Excellence, 2016). In response to this, nurses need to be managing and delivering services that can identify and care for people who are palliative and likely to be approaching the end of their lives (National Institute for Health and Care Excellence, 2019a)

Palliative and End of Life Care

The term palliative care is sometimes referred to as end of life care. Marie Curie (2014) sensitively explains the difference between the two terms. Palliative care is the treatment, care and support for people with a life-limiting illness. The aim of palliative

care is to support the patient to have a good quality life which includes being as well and active as possible for the time the person has left. This can involve:

- ✓ Planning for future care with a detailed advance care plan that expresses your individual needs and wishes
- ✓ Controlling physical symptoms, such as pain
- ✓ Emotional, spiritual and psychological support needs
- ✓ Social care needs, including assistance with washing, dressing or eating
- ✓ Support for your carers, family and friends.

Similarly, end of life care focuses on the treatment, care and support of patients nearing the end of their life. However, end life care is for people who are thought to be in the last year of life. This includes people with:

- Advanced, progressive, incurable conditions
- Frailty and co-morbidity that places them at increased risk of dying within the next 12 months.
- Existing conditions whereby they are at risk of dying suddenly from acute crisis (NICE, 2019b)

Malignant diseases such as cancer often follow a predictable trajectory of deterioration, which therefore makes care planning easier to anticipate. However, some illnesses can be problematic in predicting timeframes of mortality, particularly in patients who have non-malignant life-limiting illnesses. For example, Chronic Obstructive Pulmonary Disease, where it can be challenging to appraise if the patient

is having an acute exacerbation or if they are end of life (Cohen-Mansfield *et al.* 2017). Therefore, it is important to understand that some people might only receive end of life care in their last weeks, days or hours. Every effort should be made to ensure that wishes and preferences such as the persons Preferred Place of Care or Advanced Decisions to Refuse Treatment are sensitively discussed and documented in advance care plans as early as possible with patients and family members (National Palliative and End of Life Care Partnership, 2015).

Research undertaken by Dying Matters (2014) evidences disparity between where people would wish to die and their preferred place of care, and actual place of death. This research found that around 70% of people would choose to die at home, however 50% currently die in hospital. Yet, there appears to be a downward trend in patients dying in hospital. According to the Office of National Statistics (2018) in 2004 57.9% of patients died in hospital, in comparison in 2016 this number has fallen to 46.9% with more people dying at home (23.5%) or in their preferred place of care i.e. nursing home (21.8%) or hospice (5.7%). However, there is significant variation across the country by district and local authority, whereby the proportions of deaths in hospital ranges from 34.2% and 63.1% (Office for National Statistics, 2018). Additionally, the second preference of patients to dying at home was to ensure their symptoms, such as pain, are well controlled. Such fears surrounding symptom control at end of life often lead to patients entering hospitals for care. However, patients should be informed of care services that can adequately manage symptom control at their preferred place of care (DoH, 2012).

Nurses have the greatest opportunity to influence the end of life process for patients due to their close relationships with patients and their families (Ramplin, 2019). Community and home nursing services are best placed and crucial to supporting patients who wish to die in their own homes (Ramplin, 2019). Therefore, it is imperative that community nurses are sufficiently prepared and upskilled in end of life care discussions and symptom management to support patients. To achieve good quality end of life care, nurses will have to be both confident and competent in having open and honest discussions regarding advance care planning to ensure that the wishes and preferences of the patient are communicated and respected (National Palliative and End of Life Care Partnership, 2015).

Advanced Care Planning

Advance care planning permits the patient to state their preferred place of care and what future treatments they would except, particularly if their mental capacity is altered towards the end of life or they are unable to make decisions for themselves (Hamilton, 2017). Such decisions could mean that the patient will allow for active treatment at home e.g. for infection, emesis, or pain control, but would not want to attend hospital. These conditions can be managed via a number of administration routes at home. For example if a patient needs medications normally administered orally, but as a result of pathophysiological changes is problematic, these medicines can be delivered in the home subcutaneously either by injection for breakthrough relief of symptoms and/or continuously over 24 hours via a syringe pump (Thomas & Barclay, 2015).

In some cases, where there is a palliative medical emergency that cannot be reversed at home, such as hypercalcemia, haemorrhage, spinal cord compression and neutropenic sepsis, then the patient would be encouraged to attend hospital for treatment (Scottish Palliative Care Guidelines, 2014). If the patient is incapacitated due to the medical emergency then a decision in the best interests of the patient would be made in conjunction with a doctor, nursing team and family (NICE, 2018). However, potential interventions should be assessed to ensure they are not more burdensome than beneficial (Mathew *et al.*, 2016). An advanced care plan can prevent a patient who is actively dying from being admitted to hospital, if an admission to hospital would not change the outcome and would likely lead to the patient dying in hospital.

Setting up a syringe driver

A syringe driver is useful for symptom control when oral administration is not possible and repeated subcutaneous injections or administration of medication by other routes is inappropriate, ineffective or impractical. Although syringe drivers are primarily used in end of life care it may also be appropriate for patients who are not imminently dying. Consider using a syringe driver for the following:

- Persistent vomiting
- Reduced consciousness
- Dysphagia
- Weakness
- Bowel obstruction or malabsorption
- Significant tablet burden
- Unwilling to take tablets by mouth
- Unable to absorb oral medications
- For patients who have head and neck lesions or surgery
- Death rattle in unconscious patient
- Poor symptom control with oral drugs
- Improve patient comfort (Dougherty & Lister, 2015; Scottish Palliative Care Guidelines, 2014; O'Brien, 2015)

The goals for administering medication using a syringe driver should be discussed with the patient and any concerns addressed. It is important to explain to patients and family members that although the syringe driver may allow symptoms associated with the dying process to be helped it will not expediate the dying process. Patients and family members should be assured that the decision to start a syringe driver is not irrevocable and if the patient's symptoms improves this may be stopped (Thomas & Barclay, 2015). See table 1 for advantages and disadvantages of using syringe drivers in EOLC.

Table 1: Advantages and Disadvantages of Syringe Drivers in EOLC

Advantages	Disadvantages
Repeated injections are not required	Staff training required
Symptom control with a combination of drugs	Possible inflammation and pain at infusion sites and increased risk of infection
24 hours symptom control and comfort without peaks and troughs	Skin site availability may become a problem in emaciated patients
Only needs reloading once every 24 hours	Requires daily visits from the district nurses and other health professionals
Patients can remain ambulant	Not all drugs can be given subcutaneously

Syringe Driver

The majority of the UK uses a McKinley T34 syringe pump (see photo) **Editor please include a picture of the McKinley driver**. The McKinley T34 requires refilling every 24 hours and administers consistent therapeutic drug levels. The McKinley T34 is a compact, lightweight, portable pump and practical for use in homes and care settings. The pump has several integral safety features and the following key features:

- Rate settings in millilitres (ml) per hour;
- Mechanism to stop infusion if syringe is not properly and securely fitted;
- Alarms that activate if syringe is removed before the infusion is stopped;
- Provision of internal log memory to record pump activity
- The machine detects the size and brand of the syringe when it is loaded
- The pump will accept 10-50ml syringes which can reduce the need for two syringes if volume is high
- The pump has three sensors, barrel, collar and plunger

An understanding of the drugs that can be used in syringe drivers and the therapeutic effects is an essential component of ELOC (table 2). Nurses must safeguard the interest of patients at all times by accepting responsibility only for duties which they are competent and able to practice safely without supervision (NMC, 2015). It is suggested that theoretical knowledge alone is insufficient and nurses must be deemed competent through locally agreed competency frameworks that incorporate best practice and requirements for continuous training (O'Brien, 2015).

Table 2: Common medicines used in syringe drivers and indications adapted from NHS Scotland (2014) End of life care.

<https://www.palliativecareguidelines.scot.nhs.uk/guidelines/end-of-life-care/syringe-pumps.aspx> and [bnf.nice.org](https://www.bnf.nice.org) (2020)

Drug	Indications	Dose
Opioids		
DIAMORPHINE 5mg, 10mg, 30mg, 100mg, 500mg powder ampoules	Opioid responsive pain breathlessness	5mg to 10mg/24 hours, if no opioid before Can be diluted in a small volume Preferred for high opioid doses

MORPHINE SULPHATE 10mg, 30mg in 1ml 60mg in 2ml (other strengths not commonly used)	Opioid responsive pain breathlessness	5mg to 10mg/24 hours, if no opioid before 1 st line opioid analgesic
OXYCODONE	Opioid responsive pain breathlessness	2mg to 5mg/ 24 hours if no opioid before 2 nd line opioid analgesic if morphine/diamorphine not tolerated
Anti – emetics		
CYCLIZINE 50mg in 1 ml	Nausea and vomiting due to mechanical bowel obstruction, raised intracranial pressure and motion sickness	50-150 mg to be given over 24 hours Can cause redness, irritation at the site Incompatible with normal saline always use water for injection
HALOPERIDOL 5mg in 1 ml 10mg in 2ml	Opioid for metabolic induced nausea, delirium	2mg – 10mg/ 24 hours
LEVOMEPROMAZINE 25mg in 1ml	Complex nausea, terminal delirium/agitation	5mg to 25mg/24 hours – anti-emetic Initially 12.5 -50mg/24 hours, titrated according to response (doses 25- greater than 100mg/24 hours should be given under specialist supervision) 100mg/24 hours – sedative If purple or yellow discolouration discard – this can be caused by light exposure Second line sedative if midazolam ineffective
METOCLOPRAMIDE 10mg in 2ml	Nausea and vomiting (peristaltic failure, gastric stasis/outlet obstruction opioid)	30 -100mg/24 hours
Anticholinergics		
GLYCOPYRRIUM BROMIDE 200 mcg in 1 ml 600 mcg in 3 ml	Chest secretions or colic	0.6-1.2mg/24 hours – bowel colic and excessive secretions 2 nd line; non-sedative Longer duration action than hyoscine

HYOSCINE BUTYLBROMIDE (Buscopan) 20mg in 1ml	Chest secretions, bowel obstruction (colic, vomiting)	60-300mg/24 hours -bowel colic 20-120mg/24 hours – Excessive respiratory secretions 1 st line; non-sedative
HYOSCINE HYDROBROMIDE 400 mcg in 1ml 600 mcg in 1 ml	Chest secretions	1.2-2mg/ 24 hours Bowel Colic and excessive secretions 3 rd line; sedative Can precipitate delirium
Sedatives		
MIDAZOLAM 10mg in 2ml	Myoclonus, seizures, terminal delirium/agitation	Initially 10-20mg/24 hours, adjusted according to response; usual does 20- 60mg/24 hours Convulsions in palliative care – 20- 40mg/24hours
Steroids		
DEXAMETHASONE 3.3mg in 1ml	Brain metastases, nausea and vomiting, anorexia, bowel obstructive symptoms, emergency management of suspected superior vena cava obstruction (SVCO) or malignant spinal cord compression (MSCC)	Dose depending on indication: Ranges from 2mg to 16mg for emergency management of SVCO or MSCC. Contact specialist palliative care team for advice.

Medications are mixed with water for injection (sterile water) and normal saline (NaCl 0.9%). Sterile water is compatible with most medicines except Levomepromazine, Ondasetron, Hyoscine Butylbromide and Octreotide which should be diluted with normal saline. One of the advantages of syringe drivers is that two or more drugs (occasionally up to four) can be mixed together and infused. Knowledge of compatibility of drugs is essential (see table 3) and observation of

physical compatibility such as precipitation, discolouration or cloudiness of the infusion mixture (Thomas & Barclay, 2015). **Seek pharmacy advice for 3 or more drugs and follow local procedure guidelines.**

Table 3: Drug compatibility

Name of Drug	Morphine Sulphate	Diamorphine	Oxycodone
Cyclizine	✓	✓	✓
Haloperidol	✓	✓	✓
Glycopyrronium	✓	✓	✓
Hyoscine butylbromide	✓	✓	✓
Hyoscine hydrobromide	✓	✓	✓
Levomepromazine	✓	✓	✓
Metoclopramide	✓	✓	✓
Midazolam	✓	✓	✓

NB: Use water for injection as diluent for cyclizine (NHS Scotland, 2014; NICE 2020)

Setting up a syringe driver Equipment

- Syringe Driver
- Luer lock Syringes – manufacturers recommend the size of the syringe that should be used with their devices. Syringe drivers are calibrated in ml per hour. It is important to establish the final volume required in the syringe before choosing the size
- Drug label
- Butterfly needle or sof-set needle (cannula)
- Transparent surgical dressing
- Syringe driver case and battery
- Subcutaneous Infusion set
- Water for injection or normal saline
- Medicines
- Sharps box
- Prescription and monitoring chart
- Non sterile gloves
- Skin cleansing agent

Procedure

- Explain the rationale for setting up the syringe driver and the procedure to the patient and relatives
- Obtain consent
- Wash hands
- Check patient name and NHS number
- Ask the patient if they have any known allergies
- Check the battery for the syringe driver. If the battery is below 40% at the start of the infusion discard and use a new battery
- Set rate – this is the rate at which the syringe plunger will be moved forward by the motor in mm per hour. Special attention should be paid to the rate if the machine has returned from servicing
- Test the start button – this must be tested before administering the infusion. Press the start/test button and hold it down. Releasing the button starts the syringe driver. If the alarm does not sound the system is not safe to use (O'Brien, 2015)
- Establish the final volume required in the syringe. It is considered good practice to make the solution as dilute as possible to reduce the likelihood of drug compatibility and minimise site irritation. Check with compatibility tables and pharmacist if advice is needed (Pallativedrugs.com, 2007)
- Select syringe size. Make sure that the syringe is a good quality and Luer lock type (attached by twisting action) to avoid disconnection (O'Brien, 2015). The dimensions of syringes will vary depending on the manufacturer.
- Draw up the medication – ensure to check which dilutant to use and drug compatibility

- Write the medication on the label, date, time and signature of nurse
- Prime the line and extension set. This must be primed to the tip of the needle (O'Brien, 2015). This needs to be done manually and prior to needle/cannula insertion. Measure the volume prior to priming to the set. This will ensure that correct concentration levels are administered as prescribed. If replenishing the driver the infusion will finish early the following day. If the prescription is changed the line needs to be re-primed (Pallativedrugs.com, 2007)
- Re-explain procedure and check that the patient is in a comfortable position
- Wash hands and put on gloves
- Use skin cleansing agent to decontaminate the skin around insertion site using skin cleansing agent (Gabriel, 2015) allow 30 seconds to dry
- Gently pull the protective sheath away from the stylet
- Keep the skin taught over the insertions site and insert at a 45 degree angle (see box 1 & 2 for infusion sites and sites not suitable)
- Insert the needle/cannula into subcutaneous fat to enhance absorption of medication
- Remove stylet and dispose of immediately in a sharps container

Box 1: SC infusion sites

SC infusion sites can include:

- Anterior aspect of the upper arms
- Anterior abdominal wall
- Anterior aspect of the thigh
- Scapula
- Anterior chest wall (Gabriel, 2020)

editor please include body map

Box 2: Sites not suitable for a subcutaneous infusion

- Skin folds – the infusion site cannot be easily observed and the device cannot be safely secured. There is also a potential risk of impaired absorption.
- Limb oedema/lymphoedema – this is an infection risk and can impair absorption
- Previously irradiated skin – Impaired blood supply could reduce absorption, increased infection risk and damage to dry/delicate skin
- Bony prominences – reduced subcutaneous tissue, impaired absorption and device difficult to safely secure
- Near joints/areas of flexion – uncomfortable for the patient and a greater potential for the device to become dislodged
- Dry skin areas – increased potential for skin breakdown and risk of infection
- Infected/broken skin – increased risk of infection (Best Practice Journal, 2012)

- Cover cannula with a transparent surgical dressing
- Ensure that the device is not placed too far above the level of the infusion site.
This will increase the risk of a bolus delivery (O'Brien, 2015)
- Place the syringe driver into a locked box to avoid the pump being tampered with or damaged during infusion
- Dispose of equipment as per organisational policy
- Remove gloves and wash hands
- Ensure that the patient is comfortable

- Record the asset number of date and time the driver was set up. Document the flow rate in ml per hour. Battery percentage, diluent name and batch number. Record the drug name and batch number, total volume in the syringe (ml) drugs + diluent. Document the site used and appearance, syringe and signature of persons preparing and checking the syringe driver (pallativecaredrugs.com, 2007)
- The pump should be checked at each visit in the community and primary care settings and 4 hourly in hospital and hospice settings. Record the time and date of check.
- Check the infusion site for: redness, swelling, discomfort/pain, leakage of fluid
- Record any findings. It may be necessary to re site the cannula if the infusion site has been compromised

Conclusion

Palliative and end of life care are an essential part of nursing care. With more people choosing to die at home it is important that nurses are competent in managing this process. ELOC should always be patient-centred and include advance care planning when considering treatment. Syringe drivers are useful when the oral route of administration is not possible or absorption of medication is not optimal. It is important that discussions about medication management occur throughout the dying process and are tailored to meet individual needs.

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