

ELASTOMERIC INFUSORS IN A RESIDENTIAL PALLIATIVE CARE SETTING: a cost-benefit analysis

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Presentation Outline

Context and background

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The Hospice of Windsor and Essex County



Palliative Care

The World Health Organization (WHO) defines Palliative Care as:

“ an approach that improves the quality of life of patients and their families the problems associated with life-threatening illness, through the prevention and relief of suffering by means of early identification, an impeccable assessment and treatment of pain and other problems; physical, psychosocial and spiritual.”

Our patient population

In the residential home we take patients at a PPS of 50% or less.

- Patients often become, very weak and drowsy
- Unable to swallow
- Needing ++meds for symptom management

PPS Level	Ambulation	Activity & Evidence of Disease	Self-Care	Intake	Conscious Level
100%	Full	Normal activity & work No evidence of disease	Full	Normal	Full
90%	Full	Normal activity & work Some evidence of disease	Full	Normal	Full
80%	Full	Normal activity with Effort Some evidence of disease	Full	Normal or reduced	Full
70%	Reduced	Unable Normal Job/Work Significant disease	Full	Normal or reduced	Full
60%	Reduced	Unable hobby/house work Significant disease	Occasional assistance necessary	Normal or reduced	Full or Confusion
50%	Mainly Sit/Use	Unable to do any work Extensive disease	Considerable assistance required	Normal or reduced	Full or Confusion
40%	Mainly in Bed	Unable to do most activity Extensive disease	Mainly assistance	Normal or reduced	Full or Drowsy +/- Confusion
30%	Totally Bed Bound	Unable to do any activity Extensive disease	Total Care	Normal or reduced	Full or Drowsy +/- Confusion
20%	Totally Bed Bound	Unable to do any activity Extensive disease	Total Care	Minimal to sips	Full or Drowsy +/- Confusion
10%	Totally Bed Bound	Unable to do any activity Extensive disease	Total Care	Mouth care only	Drowsy or Coma +/- Confusion
0%	Death	-	-	-	-

Elastomeric Infusors

Non-Electronic Infusion device

Provides ambulatory infusion therapy

Infusors are mixed at pharmacy and delivered daily.

A combination of medications can be added to the

balloon, and the doses adjusted daily if needed

Replaces scheduled medications, not PRNs



Elastomeric Infusors- when to start

Most common indications

- Unable to swallow
- Unroutable
- Increase use in breakthrough medication
- Poor symptom control
- Multiple symptoms requiring multiple medications (nausea, delirium, agitation, bowel obstruction, and pain)

Our Research Questions

Has the integration of infusors in the hospice residential home:

- Decreased demands on nursing staff?
- Decreased cost?



Study Design

We completed patient chart reviews of the Hospice Residential Home, using the charts over the course of the last 1.5 years

- Inclusion: 3 complete days of MARs before and after infusor
- Exclusion: concurrent use of a CADD pump

Cost-benefit analysis: calculate cost of supplies, medications, and human resources with and without infusors in each case

Quality improvement: examine trends to help optimize use of infusors

Calculations

Compared infusor with equivalent around the clock dosing by traditional administration based on 3 days immediately after initiating the infusor

Recorded nursing time required

Average med administration time: 4.1min for each medication given

Average infusor management time: 18 min over 3 days

Calculated total costs

- Supplies: Syringes, needles, Cleos (subcutaneous infusion device), gloves, alcohol swabs, infusors
- Medication cost: By box vs cost of medications in the infusor
- Human resources: nursing time for medication administration

Baseline Characteristics

19 cases reviewed Apr 2017 - Aug 2018

12 malignant, 7 non-malignant

8 males, 11 females

Infusor started most often at PPS 20%

Most common combo: opiate + antipsychotic + benzo
eg. (hydromorphone/midazolam/haldoperidol)

Number of Medication Administrations

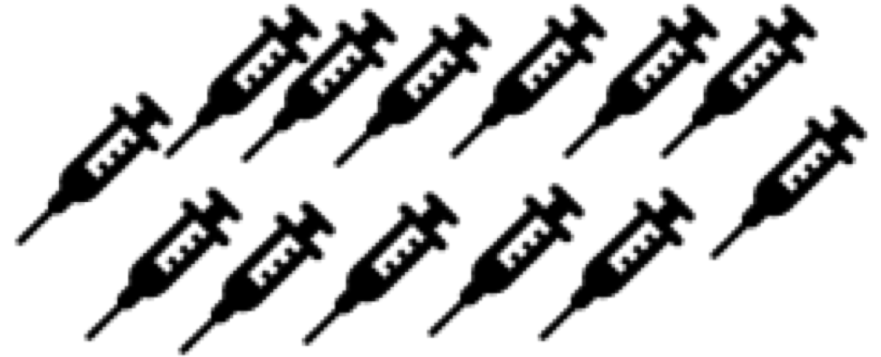
With infusor: 1.6 doses/day

(use of as needed medication PRNs)



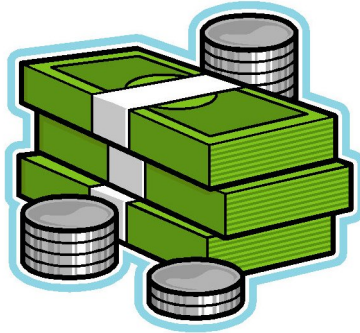
Without: 13 doses/day

(Includes around the clock and PRNs)

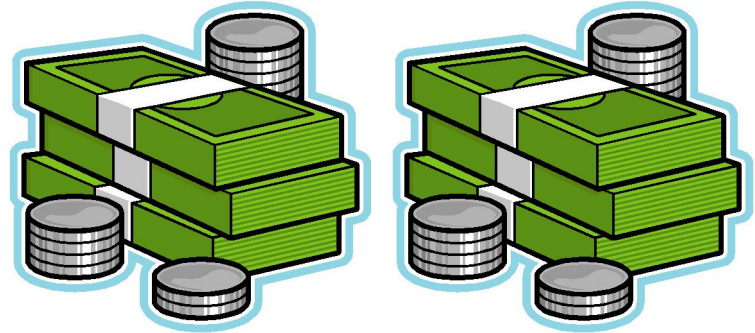


Cost of Medications per Day

With Infusor: \$79.40 (\$25-199.10)
Average Cost



Without infusor: \$136.80 (\$20.90-
279.20) Average Cost



Nursing time spent and cost /day

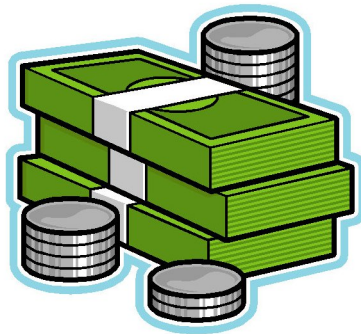
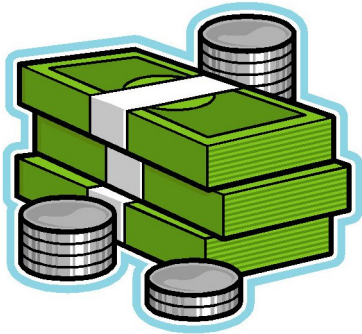
With infusor: 14 min (6min-36min) x\$28/hour = \$6.50 /day

Without infusor: 58min (24min-94min) x\$28/hour = \$27.07/day

Infusors reduced the amount of time nurses spent on administering medications in every case, by an average of 44min per day per patient

Cost of supplies

With infusor: \$46.60 (\$40.50-63.00)



Without infusor: \$19.00 (\$9.10-27.60)



Environmental Impact



Total cost/day

With infusor: \$82.01 (\$51.87-147.31)

Without infusor: \$93.43 (\$36.65-167.74)

On average, \$11 was saved per day per persons on infusors

Infusors were ALWAYS more cost-effective with 3 medications and NEVER with 1 medication

Summary

- Cost of medications lower with use of infusor
- Cost of human resources lower with infusor
- Infusors decreased nursing time spent on medication administrations
- Cost of supplies higher with infusor (due to device cost)
- Environmentally friendly - reduction in single use plastic
- Overall infusors are more cost effective than administering medications around the clock when 2 or more medications are used

Other considerations

Nursing time saved = patient time spent with family

Future studies:

- Better symptom control - anecdotal
- Patient and family satisfaction - anecdotal

Easy to apply in conventional home care setting

Infusor application in community home care

Unpaid caregivers – overwhelming, less medication administration

Decreased nursing visits; easy to teach caregiver and reduce visits

Waste reduction

Safety issues

A Case Study

Pediatric patient with CHF secondary to congenital heart defect

Patient doesn't want to go to hospital and hates needles, parents promised to keep the patient home for end of life care

Significant pain, edema, shortness of breath, and ++anxiety around injections

Started 1 infusor with lasix and 1 infusor with dilaudid and haldol, then versed

Outcomes

- Improvement in pain and symptoms. Caregiver reported that patient slept well at night, more periods of wakefulness, no complaints of nausea
- Enjoyed favourite foods without vomiting, more quality time spent with family
- Most important medications were in the infusors, limited # of SC injections
- Died comfortably and peacefully 5 days after infusor started

Final Thoughts

- Infusors are a cost-effective option when 2 or more subcutaneous medications are required around the clock in palliative patients in a residential setting
- Future studies are needed on patient and family centred outcomes like symptom control and satisfaction
- Simple to implement and lots of potential to expand use into home care settings

Acknowledgements

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Thank you!

Questions?

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Appendix 1: Nursing costs

Nursing time/med administration: 4.1 min average

Nursing time for infusor management: 18min/3days

- 16 min average for set up
- 1 min average to change daily

Hourly nursing rate: \$28/hour (starting rate for community nurse)

Appendix 2: Cost of supplies

Infusor device: \$36.08 daily

Cleo sets \$13.37 per medication site, weekly

- Includes: tegaderm x2, gloves x2, chlorahexadine swab, alcohol swabs

1mL BD syringe with Luer Lok Tip: \$0.25

1mL BD Safety glide with 27G needle: \$1.60

3mL BD Syringe with Luer Lok Tip: \$0.15

BD Eclipse Needle: \$0.25

Pair of latex free gloves: \$0.06

Alcohol swab: \$0.03

Appendix 3: Cost of medications

Hydromorphone: \$43.46/box

Morphine: \$20.91/box

Haldoperidol: \$48.40/box

Methotrimeprazine: \$36.38/box

Metoclopramide: \$75.85/box

Midazolam -> Lorazepam: \$35.87/vial

Dexamethasone: \$16.90/box

Infusor: \$8 dispensing fee + \$7 normal saline + \$5/medication ->daily

Appendix 4: Around the clock dosing equivalents

Hydromorphone: q4h = 6/day

Morphine: q4h = 6/day

Haldoperidol: q4h = 6/day

Methotrimeprazine: q8h=3/day

Metoclopramide: QID = 4/day

Midazolam -> Lorazepam: q6h = 4/day

Dexamethasone: BID = 2/day

Appendix 5: Sample Calculation

DI - 59y.o M with Colon Cancer

Infusor: hydromorphone and haloperidol

PRNs 72hrs after infusor: hydromorphone x 5, midazolam x 2

With infusorWithout infusor

Total medication administrations /72 hours	1 infusor set up + 7 PRNs	= 8	36 ATC (6 dilaudid + 6 haldol x3 days) + 7 PRNs	= 42
Nursing time /72 hours	18 min (set up+ 2 changes) + (7 PRNs x 4.1 min) + (2 cleo set ups x 4 min)	=54.7min =0.9 hrs	42 admins (36 ATC + 7 PRN) x 4.1 min + 3 cleo set ups x 4 min	=172.2min =2.9hrs
Nursing cost /72 hours	0.9 hours x \$28/hour	=\$25.50	2.9 hours x \$28/hour	=\$81.20
Medications costs /72 hours	Infusor medications (\$8 dispensing +\$7 normal saline + \$5x2medications) x3 days + \$43.46 (box of dilaudid for PRNs) + \$41.00 (box of midazolam for PRNS)	=\$109.46	\$43.46 (box of dilaudid for ATC + PRNs) + \$48.30 (box of Haldol for ATC) + \$41.00 (box of midazolam for PRNS)	=\$199.37
Cost of supplies /72 hours	\$36.08 x 3 (infusorx3 days) + 3x\$13.37 (cleo sts, 1 infusor, 1 dilaudid, 1 midazolam) + 7x \$0.56 (syrigine+needle+gloves+swabs for PRNs)	=\$155.92	42 x \$0.56 (syringe+needle+gloves+swabs for each ATC and PRN) + 3x\$13.37 (cleo sts, 1 dilaudid, 1 haldol, 1 midazolam)	=\$65.91
Total Costs/day	<u>25.50 (RNs) + 109.46 (Meds) + 155.92 (supplies)</u> 3 days	= \$96.97	<u>81.20 (RNs)+199.37 (meds) + 65.91 (supplies)</u> 3 days	= \$115.49