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

Michelle Parker RN, BScN, CHPCN(c)
The Hospice of Windsor and Essex County

Presenting on behalf of:
Anam Asim; Patricia Valcke CCFP(PC), MD

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Presentation Outline

Context and background
Study Questions
Methods
Results
Discussion
A Case Study
Conclusions
Appendices
The Hospice of Windsor and Essex County

Context and Background
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
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
- Unrousable
- 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 person 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 not want 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 centered outcomes like symptom control and satisfaction.

• Simple to implement and lots of potential to expand use into home care settings.
We thank

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Thank you!

Questions?
mparker@thehospice.ca
pvalcke@thehospice.ca
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
Di - 59y.o  M with Colon Cancer

Infusor: hydromorphone and haloperidol

PRNs 72hrs after infusor: hydromorphone x 5, midazolam x 2
<table>
<thead>
<tr>
<th></th>
<th><strong>With infusor</strong></th>
<th><strong>Without infusor</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>**Total medication</td>
<td>1 infusor set up + 7 PRNs</td>
<td>36 ATC (6 dilaudid + 6 haldol x 3 days) + 7 PRNs</td>
</tr>
<tr>
<td>administrations</td>
<td>= 8</td>
<td>= 42</td>
</tr>
<tr>
<td>/72 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nursing time</strong></td>
<td>18 min (set up + 2 changes) + (7 PRNs x 4.1 min) + (2 cleo set ups x 4 min)</td>
<td>42 admins (36 ATC + 7 PRN) x 4.1 min + 3 cleo set ups x 4 min</td>
</tr>
<tr>
<td>/72 hours</td>
<td>=54.7 min =0.9 hrs</td>
<td>=172.2 min =2.9 hrs</td>
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<tr>
<td><strong>Nursing cost</strong></td>
<td>0.9 hours x $28/hour</td>
<td>2.9 hours x $28/hour</td>
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<tr>
<td>/72 hours</td>
<td>=$25.50</td>
<td>=$81.20</td>
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<tr>
<td><strong>Medications costs</strong></td>
<td>Infusor medications ($8 dispensing + $7 normal saline + $5 x 2 medications) x 3 days + $43.46 (box of dilaudid for PRNs) + $41.00 (box of midazolam for PRNS)</td>
<td>$43.46 (box of dilaudid for ATC + PRNs) + $48.30 (box of Haldol for ATC) + $41.00 (box of midazolam for PRNS)</td>
</tr>
<tr>
<td>/72 hours</td>
<td>=$109.46</td>
<td>=$199.37</td>
</tr>
<tr>
<td><strong>Cost of supplies</strong></td>
<td>$36.08 x 3 (infusor x 3 days) + 3 x $13.37 (cleo sets, 1 infusor, 1 dilaudid, 1 midazolam) + 7 x $0.56 (syringe+needle+gloves+swabs for PRNs)</td>
<td>42 x $0.56 (syringe+needle+gloves+swabs for each ATC and PRN) + 3 x $13.37 (cleo sets, 1 dilaudid, 1 haldol, 1 midazolam)</td>
</tr>
<tr>
<td>/72 hours</td>
<td>=$155.92</td>
<td>=$65.91</td>
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<tr>
<td><strong>Total Costs/day</strong></td>
<td>25.50 (RNs) + 109.46 (Meds) + 155.92 (supplies)</td>
<td>81.20 (RNs) + 199.37 (Meds) + 65.91 (supplies)</td>
</tr>
<tr>
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<td>= $96.97</td>
<td>= $115.49</td>
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