Painful Infusions of Potassium

A Potassium Protocol

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Objective

To identify strategies for intervention when the patient experiences pain during infusion of potassium.

Demonstrate the impact of relatively simple solutions on patient’s pain.
Case Study

78 year old female c/o abdominal pain and nausea and vomiting x 1 week, presents in the operating room for a small bowel resection. She has a history of CHF, HTN, ↑cholesterol, CAD, A fib, diabetes on multiple medications including diuretics.

Postop she is slow to recover. Lab calls to report a critical value, K is 2.7. Nurse notifies the surgeon and an order is generated for potassium replacement.
# Anticipated outcome

<table>
<thead>
<tr>
<th>Normal</th>
<th>Potential Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery benchmarks</td>
<td>Poor recovery</td>
</tr>
<tr>
<td>Fluid &amp; electrolyte balance</td>
<td>Exacerbation of primary conditions</td>
</tr>
<tr>
<td>Manage underlying conditions</td>
<td>Phlebitis</td>
</tr>
<tr>
<td>Return to regular activity</td>
<td>Vascular injury</td>
</tr>
<tr>
<td></td>
<td>Cellulitis</td>
</tr>
<tr>
<td></td>
<td>Increased LOS</td>
</tr>
<tr>
<td></td>
<td>Increased $$$</td>
</tr>
<tr>
<td></td>
<td>Poor outcome</td>
</tr>
</tbody>
</table>
Role of Potassium

Hypokalemia:
- Most common cause - GI loss
- Diuretics - GU loss

Clinical Picture
- Muscle weakness/spasticity
- Lethargic
- Cardiac dysrhythmia
- Nausea and Vomiting
- Fluid Imbalance
Managing the pain from K+ IV infusion

Where do I start?

• Relieve the discomfort
• Get through the situation
• Handle the next case better
  ❑ Consult colleagues
  ❑ Find a best practice reference
  ❑ Apply some critical thinking
Dealing with the frustration

- No guidelines or references
- No consensus on intervention
- Poor Patient/Family Satisfaction
- Risk of flagging for Med error

What to do next????
Journey begins

- Bring issue to Nursing Practice Council
- Solicit interprofessional perspective- Pharmacy & Therapeutic Committee
- Search the literature
- Explore current practices
Shared Governance

- P&T Committee
- Nursing Leadership Committee
- Nursing Practice Council & Nursing Research Council
- Nursing Informatics
- Interprofessional Task Force
Organizational Resources

- Administrative awareness/leadership
- Interprofessional communication/input
- Nurse Practice Council
  - Evidence based practice
  - Policy and procedures
- Nursing education
  - Magnet resources
  - Practice integration
Magnet Resources

- Bedside Scholars program
- Clinical Scholar Mentoring Group
- Magnet Program Coordinator
- Academic Advisor
EBP Model: ACE Star

The Research Council uses the Academic Center for Evidence-based Practice (ACE) model of transforming knowledge into evidence-based practice.
PICO question

**Problem** - Patients on K+ IV infusion unable to take oral K+ and refuse infusions due to complaint of pain

**Intervention** - Measure the prevalence of patient complaint/discomfort during K+ IV infusion and identify strategies that reduce pain

**Comparison** - Compare strategies practiced by RNs

**Outcome** - Establish a standard of care for pain management at the site of K+ IV infusion
No standard of care or best practice for pain management of potassium infusions

In the medical literature
In pharmacy literature
In nursing literature
Method - Data collection

• First 3 months (1st quarter):
  - Monitoring of Electronic Health Record for Adverse Drug Event

No events reported!
Survey design—a joint effort

Successful collaboration between Pharmacy and Nursing:

- To identify KCL order
- Fill order
- Attach paper survey form
- Retrieve form from units
- Collate responses for analysis
**Survey on pain at site of peripheral IV KCL infusion**

Please complete each time you give peripheral IV KCL infusion, either bolus or IV maintenance infusion.

When patient develops pain* at the infusion site when administering KCL, what action did you take?

<table>
<thead>
<tr>
<th>Application of ice</th>
<th>I tried this (put Yes or No)</th>
<th>Did this work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjust rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevate extremity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topical oint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-medicate (ie Tylenol)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHER (identify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Angio size</th>
<th>Site location</th>
<th>Maintenance drip</th>
<th>KCL bolus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
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</tr>
</tbody>
</table>

**Please indicate the strategy that you have found most successful in relieving patient pain and discomfort:**

Pain scale (1-10) _______ (how much pain does the patient report at IV site or along IV route?)

Name____________________ Unit____
Methods - Data collection

Second 3 month (2\textsuperscript{nd} quarter):

- Monitoring by use of \textit{paper} survey attached to K+IV infusion delivered to nursing unit

- \textbf{Large increase in response rate!}
Results

After 3 months of data collection (SURVEY N=90)

Analysis of Data reported infusion site pain was decreased by the following:

- K+ IV infusion rate lowered—52 %
- Ice pack application—17 %
- Extremity elevation—16 %
- Pre-medicate/other—4 %
Have you tried any of these interventions?

What about warm remedies as opposed to cold?
IV Potassium Protocol

NewYork-Presbyterian Hudson Valley Hospital

IV Potassium Protocol

Order for 10 meq KCl/100ml D5W or 0.9NS IV Piggyback to infuse over 60 min.

Pain at Infusion Site?

No

Yes

Continue with infusion @ 100ml/hr

Pain level ≤ or = 5 then ↓IV rate to 75 ml/hr

Or

Pain level > 5 then ↓IV rate to 50 ml/hr

If pain persists:
- Application of ice pack/cold compress
- Elevate extremity

Reassess pain level within 15 min and notify MD if pain persists.
Document rate changes on MAR in comments section

References:

Deguzman, Z. C. et al. (2013) Bacteriostatic normal saline compared with buffered 1% lidocaine when injected intradermally as a local anesthetic to reduce pain during intravenous catheter insertion. Journal of PeriAnesthesia Nursing, 27(6).

Steps in EBP process

✓ Analyze the data
✓ Present evidence to committees
✓ Translate the evidence into development of a protocol
☐ Integrate the protocol into practice
☐ Evaluate the effectiveness of the protocol
Labeling IV Potassium Dose

Nursing-Pharmacy collaboration
Follow-up Survey

Follow up Peripheral IV KCL Infusion Survey

Survey on Pain at site and Use of Peripheral IV KCL Infusion Algorithm

Please complete each time you give peripheral IV KCL infusion, either bolus or IV maintenance infusion.

When patient develops pain* at the infusion site when administering KCL what action did you take:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Check which intervention was used</th>
<th>Check which intervention was effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application of cool compress</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application of warm compress</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjust rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevate Extremity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain Medication administered? Name</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Did you use the algorithm found on Pharmacy Homepage

PAIN AT INFUSION SITE (prior to intervention): Pain Scale (1-10) ______
PAIN AT INFUSION SITE (post intervention): Pain Scale (1-10) ______

8/2017EH/MMA

RETURN COMPLETED FORM TO PHARMACY (via pneumatic tube)
Nursing Interventions for pain related to Infusion of IV Potassium

Interventions for pain relief related to IV Potassium Infusion

- Adjusted rate: 52% pre-protocol, 60% post-protocol
- Applied ice pack: 17% pre-protocol, 36% post-protocol
- Elevated extremity: 16% pre-protocol, 21% post-protocol
- Pre-medicated: 4% pre-protocol, 3% post-protocol
Nursing Interventions for Pain Related to Infusion of IV Potassium

<table>
<thead>
<tr>
<th></th>
<th>pre-protocol 2015</th>
<th>post-protocol 2016</th>
<th>post protocol 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>adjusted rate</td>
<td>52%</td>
<td>60%</td>
<td>66%</td>
</tr>
<tr>
<td>applied ice pack</td>
<td>17%</td>
<td>36%</td>
<td>42%</td>
</tr>
<tr>
<td>elevated extremity</td>
<td>16%</td>
<td>21%</td>
<td>14%</td>
</tr>
<tr>
<td>pre medicated</td>
<td>4%</td>
<td>3%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Average Reported Pain Level related to IV Potassium Infusion

Pain Level

- Pain level pre-protocol
- Pain level post-protocol

2016
- 7.3
- 3.2

2017
- 7.2
- 1.5
Lessons Learned

- Bedside nurse participation
- Interprofessional collaboration
- Research that involves surveys and questionnaires depends on response rate
  - Missing data
  - Cause of not getting forms returned.
- Academic support
Question

Does the pain during infusion of potassium mean the venous system could be harmed?

Are we possibly masking phlebitis?
Future areas for research

- Multi-site validation through a research study
- Explore clinical items not included in this project
  - Warm compress was not tested.
  - Were there clinical signs and symptoms associated with low K level.
  - How many orders were D/C’d as the only action taken

Is there a risk of phlebitis with each infusion?
Summary

- Documented resource
- Modify order entry
- Nurse-Patient relationship
- Improve patient outcomes

“I think one's feelings waste themselves in words; they ought all to be distilled into actions which bring results.

FLORENCE NIGHTINGALE

Deguzman, Z. C. et al. (2012) Bacteriostatic normal saline compared with buffered 1% lidocaine when injected intradermally as a local anesthetic to reduce pain during intravenous catheter insertion. *Journal of PeriAnesthesia Nursing, 27*(6).


References

- Academic Center for Evidence-based Practice (ACE) model of transforming knowledge into evidence-based practice. The University of Texas Health Science Center at San Antonio (2009) [http://www.acestar.uthscsa.edu](http://www.acestar.uthscsa.edu)
Contact Information

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