Nursing Implications in the Use of Nesiritide: A Retrospective Study

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Introduction

Cardiac care nurses must keep abreast of current medications in order to effectively care for their critical patients. Nesiritide (BNP, Natrecor) is the first new drug in over a decade to be approved by the FDA for the treatment of acute congestive heart failure. A current review of literature reveals only two published pediatric case reports in the use of nesiritide. The review of literature also indicates that there are now questions arising in the medical community regarding the relationship of nesiritide use, renal failure, and rate of death at 30 days. These reports do not include nursing implications for the use of nesiritide. Nursing practice is improved when evidenced-based studies and findings guide nursing care. Through evidenced-based studies, protocols can be developed which provide effective homogenous management of patient care issues. A retrospective chart review was therefore conducted with the purpose of determining an evidence-based approach for the implications of nursing practice in the use of nesiritide.

As a result, the CVICU implemented a standard of nursing care for pediatric patients receiving nesiritide. CVICU nurses received education regarding the new standard and chart reviews were conducted after 6 months to determine consistency in appropriate nursing interventions. In light of safety concerns in the adult population, preliminary data was collected regarding hemodynamic, urine output, creatinine level, and 30 day mortality rates with nesiritide use in the pediatric patient.

Methods

Sample and Setting

The sample consisted of 43 patients receiving a nesiritide infusion in a PICU and NICU at a single children's hospital.

Procedure

A nonrandomized, comparative, retrospective design was used. After a through literature search and consultation with intensivists and cardiac surgeon a guideline was written for the use of nesiritide infusion in the PICU. Teaching was done for the PICU "primary cardiac nurses" in October 2004 in a team meeting and on an individual basis. A list of patients receiving this drug from July 1, 2004 to August 1, 2005 was obtained through a computer query performed by a pharmacist. Data was collected by chart audits after patient discharge. Data collected included date of birth, discharge date, diagnosis, surgical repair, nesiritide start, titration and max dose, vital sign documentation and attention of nurses with and without previous training in the use of nesiritide. Systolic, diastolic, and mean blood pressures were also collected. Nesiritide start and discontinue times with total infusion hours as well as previous or concomitant use of diuretics and inotropes were documented. Pre (-), during, and post (-) nesiritide infusion creatinine levels, and urine output were collected in addition to survival at discharge and 30 days post discharge.

Data Analysis

Of the 42 patients receiving nesiritide, 3 were excluded (1 > 18 years, 2 neonate with congenital deformities and parental decision for DNR status) and 15 due to unavailability of charts. There were 34 occurrences for the 26 patients included. Ages ranged from newborn to 14 years.

To ratio/rate data several assumptions were made. The term "trained" assumed the nurse was aware of and educated in the recommended guidelines and dosing with its use. "Untrained" assumed the nurse was not aware of or educated in the availability of the guidelines and would therefore use alternative methods to verify appropriate dosage and practice in the use of nesiritide. It was assumed therefore that trained nurses would question inappropriate physician orders and also recognize the need for titration of this drug when appropriate.

Results

Changes with Nesiritide Infusion

		Mean
Systolic BP	(26%) to 26%	(0.2%)
Diastolic BP	(26%) to 21%	(10%)
Mean BP	(27%) to 21%	(7.3%)
Pre-Creatinine		0.7
During Creatinine		1.1
Post-Creatinine		0.8
Drug Infusion	3 to 403 hours	110
Pre-UOP (cc/kg/hr)		3.38
Post-UOP (cc/kg/hr)		3.8
Survived to ICU	33/33; 96%	
Survived to 30 Days	6/6 known; 100%	

Our study has several limitations.

- Retrospective Study
- Multiple Variables
- Only "cardiac nurses" educated
- NICU nurses not educated
- Teaching facility; accompanied MD orders
- Standard practice to NOT bolus initial dosing
- Creatinine levels inconsistently assessed
- Portions of charts inaccessible

Nursing Implications

Natrecor: Human B type natriuretic peptide that binds to guanulate cyclase receptor of vascular smooth muscle and endothelial cells, leading to increased cGMP and smooth muscle relaxation. cGMP serves as a second messenger to dilate veins and arteries
- Decreases PCWP and systemic arterial pressure
- Suppresses the renin-angiotensin-aldosterone system

Dosage and Administration:
(1) bolus dose – 2mC g/kg over 60 seconds
Starting dose for continuous infusion – 0.01 mCg/kg/min
Maximum continuous infusion – 0.03 mCg/kg/min
Increase rate by 0.005 mCg/kg/min
- (preceded by a bolus of 1 mCg/kg) every 2-3 hours

Onset of Action: 15 minutes
Peak: late hour
Duration: > 60 minutes (up to several hours)
Half-life: 18 minutes
- Reaches steady state in 90 minutes. Hypotensive effects can last up to 2 hours

Elimination: cellular internalization proteolytic clearance of the peptide by endopeptidases and renal filtration (dosing does not need to be adjusted for renal failure)

Compatibility: Normal Saline, 1/2NS, 0.2NaCl, D5W, or D10W
- Replace Natrecor syringe every 24 hours

Incompatibilities: Heparin, Insulin, Bactrim, Bumex, Enalapril, Hydralazine, and Lasix

Adverse Reactions: Hypotension, headache, nausea, and back pain

Contraindicated: Cardiogenic shock, low cardiac filling pressures, hypovolemia/vitis, significant valvular stenosis, restrictive cardiomyopathy, and constrictive pericarditis

Documentation:
1) SBP, DIAP, CI, PCWP
- (documented every 15 minutes during titration up to one hour after last dose change, then hourly)

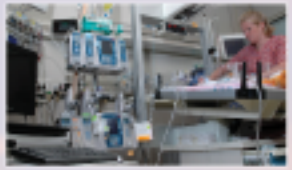
2) Hourly UOP and peripheral perfusion
3) Initial bolus followed by 0.01 mCg/kg/min infusion
4) Titration dose and rate: 0.005mCg/kg/min every 2-3 hours
5) D5W, NS, ½ NS, 0.2NaCl, or D10W reconstitution
6) Natrecor syringe changed every 24 hours
7) If inadequate cardiac filling pressures: intervention and outcome documented.
8) Monitor daily creatinine.

Conclusions

Nursing practice is improved when evidenced-based studies and findings guide nursing protocols. These protocols provide direction in effectively managing common inpatient care issues. Cardiac care nurses must keep abreast of current medications in order to effectively care for their critical patients. Study results determined that nesiritide education, associated with care guidelines, improve nursing awareness and appropriate interventions. As a result of this study, several guideline points were modified to reflect appropriate practice and follow-up. In spite of lack of use at this institution, no research to determine appropriateness of lack of initial or retrobolus with titration has been found in the literature search to reflect this practice and will remain in the guidelines. Recommended increase will remain at 0.005 mcg/kg/min as this study did not address appropriate titration changes. Vital sign documentation was eased as a result of lack of significant mean changes in blood pressure values. With recent controversy in adult studies regarding nesiritide renal failure, and mortality rates, monitoring creatinine levels was also added to the guideline to increase nurses' awareness of potential complications. This study was an initial attempt to provide evidence of the value of nursing guidelines in the use of a new drug. Through this limited study it appears that this supposition is accurate and valid. However, further studies with a larger sample and controlled variables are needed to provide additional results.

Acknowledgements

We are grateful to the nursing and medical staff of the study unit, to the pharmacy data collectors, Bill Burr and Phirung Wood, for their collaboration and helpful participation, as well as Kevin Makowski without whose talents the final poster could not have been realized.



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