Retrospective chart evaluation of the efficacy of hypercalcemia management in oncology patients at the University of Chicago Medical Center

Kelly Plach, Pharm.D, Department of Pharmacy | Rita Nanda, M.D, Department of Medicine – Hematology/Oncology Division |
Randall Knoebel, Pharm.D, BCOP, Department of Pharmacy | Katherine Shea, Pharm.D, BCOP, Department of Pharmacy
The University of Chicago Medicine, Chicago, Illinois

THE UNIVERSITY OF CHICAGO MEDICINE

Background

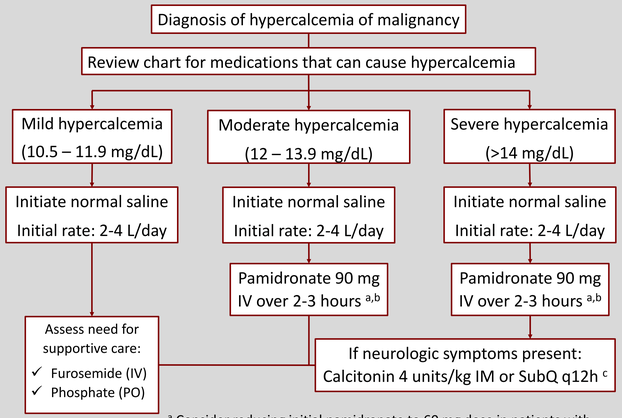
Hypercalcemia of malignancy is an oncologic emergency that occurs in approximately 10-30% of patients with cancer, and indicates advanced disease. [1-4]

Previous studies have shown that among patients who experience hypercalcemia of malignancy, 50% will die within 30 days and 6.8% demonstrate in-hospital mortality.[1-2] Despite the frequency of occurrence and poor prognosis, official guideline recommendations are lacking for management of hypercalcemia of malignancy. Furthermore, University of Chicago Medical Center (UCM) has not previously had an established protocol to guide hypercalcemia management.

This research project proposed a protocol for future management of hypercalcemia of malignancy at UCM based on available literature. The protocol was then retrospectively applied to patients treated for hypercalcemia of malignancy in order to evaluate the effectiveness of current management. Patients were divided based on whether or not treatment was received per protocol, and results were analyzed in order to validate the proposed protocol.

Proposed Protocol

Figure 1: Protocol Algorithm



[a] Consider reducing initial pamidronate to 60 mg dose in patients with pre-existing renal dysfunction.
[b] In patients with decreased renal function (CrCl < 30 mL/min), extend infusion rate to 4-6 hours.
[c] Increase calcitonin dose to 8 units/kg IM or SubQ q12h after 1-2 doses if unresponsive.

Methods

Design:
- Retrospective, single center, observational study

Inclusion Criteria:
- Patients age 18 years and older admitted with a diagnosis of both hypercalcemia and active malignancy.
- Available laboratory values at baseline and day four and/or seven of treatment.

Exclusion Criteria:
- Patients already receiving treatment with bisphosphonates or denosumab as an outpatient to prevent skeletal related events, or within seven days prior to admission for hypercalcemia of malignancy.
- Patients with hypercalcemia related to a cause other than malignancy

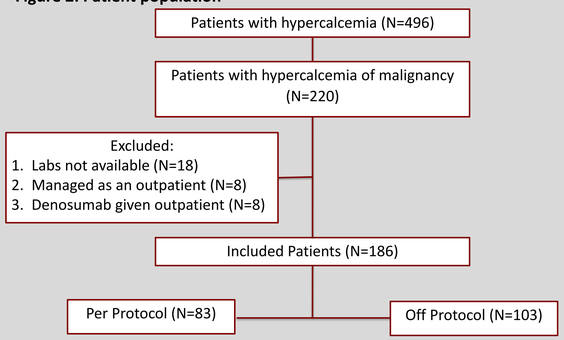
Data Analysis:
- Descriptive statistics will be used to measure demographic data as well as intervention utilization rates
- Mann-Whitney U test compared continuous data.
- Fisher's exact tests compared categorical data.

Primary Endpoint:
- Normalization of corrected calcium (< 10.5 mg/dL) within 4-7 days of treatment

Secondary Endpoints:
- Inpatient Mortality
- Length of stay
- Percent decrease in corrected calcium after 7 days of bisphosphonate therapy
- Appropriateness of rescue therapy

Data Collection

Figure 2: Patient population



Results

Table 1. Day four corrected calcium normalization rates

	At goal	Not at goal	P value
Overall Results			
Per Protocol (N=82)	54 (65.85%)	28 (34.15%)	1.00
Off Protocol (N=103)	67 (65.05%)	36 (34.95%)	
Mild Hypercalcemia			
Per Protocol (N=27)	24 (88.89%)	3 (11.11%)	0.74
Off Protocol (N=36)	32 (91.43%)	3 (8.57%)	
Moderate Hypercalcemia			
Per Protocol (N=24)	15 (62.5%)	9 (37.5%)	0.24
Off Protocol (N=48)	23 (47.92%)	25 (52.08%)	
Severe Hypercalcemia			
Per Protocol (N=31)	15 (48.39%)	16 (51.61%)	0.57
Off Protocol (N=20)	12 (60%)	8 (40%)	

Table 2. Day four corrected calcium normalization rates

	At goal	Not at goal	P value
Overall Results			
Per Protocol (N=55)	40 (72.73%)	15 (27.27%)	0.44
Off Protocol (N=68)	44 (64.71%)	24 (35.29%)	
Mild Hypercalcemia			
Per Protocol (N=15)	11 (73.33%)	4 (26.67%)	1.00
Off Protocol (N=18)	14 (77.78%)	4 (22.22%)	
Moderate Hypercalcemia			
Per Protocol (N=17)	14 (82.35%)	3 (17.65%)	0.07
Off Protocol (N=34)	19 (55.88%)	15 (44.12%)	
Severe Hypercalcemia			
Per Protocol (N=23)	15 (65.22%)	8 (34.78%)	1.00
Off Protocol (N=16)	11 (68.75%)	5 (31.25%)	

Figure 3. Mortality Rates

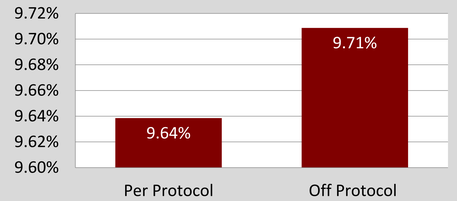


Table 3. Relapsed/Refractory Hypercalcemia

	Mild	Moderate	Severe	Overall
Not Required	33.87%	69.44%	68.63%	57.3%
Not Applicable	61.29%	20.83%	1.96%	29.19%
Pamidronate	4.84%	6.94%	17.65%	9.19%
Zoledronic Acid	--	1.39%	11.76%	3.78%
Denosumab	--	1.39%	--	0.54%
Administration Timing				
Within seven days	--	29%	20%	20%
Greater than seven days	100%	71%	80%	80%
Renal Dose Adjustment				
Appropriate	66.67%	57.14%	66.67%	64%
Inappropriate	33.33%	42.86%	33.33%	36%

Limitations

- Single center study
- Retrospective design
- Lack of power calculation
- Significant confounding variables
- Lack of power to detect a difference between pamidronate and zoledronic acid

Areas for Improvement

- Bisphosphonate utilization in mild hypercalcemia
- Bisphosphonate dosing in renal impairment
- Intravenous phosphate utilization
- Fluid management
- Calcitonin dosing

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Disclosures

The authors of this presentation have no financial interests with commercial entities that may have a direct or indirect interest in the subject matter of this presentation