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Differences in Pain Management Between Hematologists and Hospitalists Caring for Patients with Sickle Cell Disease Hospitalized for Vaso-Occlusive Crisis

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Abstract

Sickle cell disease (SCD) is a chronic disease characterized by multiple vaso-occlusive complications and is increasingly cared for by hospitalists. We performed a single-institution, retrospective review of pain management patterns and outcomes in adult SCD patients hospitalized for vaso-occlusive crisis. Over 26 months, we found a total of 298 patients (120 cared for by the hematologists and 178 by hospitalists), with a mean age of 32 (range 19 – 58). Patients cared for by hospitalists had a lower total number of hours on a patient controlled analgesia (PCA) device (171 vs. 212 hours, $p=0.11$). Hospitalists also were significantly more likely to utilize demand only PCA (42% vs. 23%, $p=0.002$) and had a significantly lower rate of using both continuous and demand PCA (54% vs. 67%, $p=0.04$). In addition, patients cared for by hospitalists had a significantly shorter hospitalization (8.4 days) compared to hematologists (10 days, $p=0.04$) with a non-significant difference in 7 and 30 day readmission rates (7.2% vs. 6.7% and 40% vs. 35% respectively). In conclusion, we found patients cared for by hospitalists more frequently utilized home oral pain medication during admission, had shorter lengths of hospitalization, and did not have a significant increase in readmission rates.

Keywords

sickle cell; pain crisis; hospitalists

INTRODUCTION

Sickle cell disease (SCD) is one of the most common inherited diseases worldwide and a chronic disease characterized by multiple vaso-occlusive complications. Stroke, acute chest

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syndrome and infection create significant morbidity and mortality in this population. Additionally, patients are often hospitalized for painful vaso-occlusive crisis (VOC) that can be severe, disabling, and require treatment with opioid medications.

Importantly, vaso-occlusive crisis (VOC) is the most common cause for hospitalization for patients with SCD. Our institutional review of fiscal year 2011 SCD data, found that 26% of patients with SCD were evaluated within the emergency department (ED) at least once, and 50% of these patients were admitted from the ED for a mean length of stay of 6.7 days (De Castro, unpublished institution data). Within the US, there are 113,000 admissions and \$488 million in hospitalization costs annually for the care of patients with SCD¹.

Enhanced care through recommendations for prophylactic penicillin and immunizations for patients with SCD has improved survival. Quinn et al recently reported overall survival of 85.6% at 18 years of age². This has led to increasing rates of hospital admissions as seen in a recent review of adult and pediatric admissions by Smith et al which found 29% of patients age 1–17 years were admitted in 2005 and 20% were admitted in 2008. In contrast, 61% of patients 18–44 years were admitted in 2005 increasing to 69% in 2008³.

Over the past decade, hospitalized adult patients with SCD have been increasingly managed by hospitalists rather than hematology specialists. This transition has occurred for a variety of reasons and may include financial reasons and lack of adult hematologists. Our institution also recently transitioned the care of inpatients with SCD from the hematology service to the hospitalists group. Hospitalists may have specific care differences, however provide efficient inpatient management. Therefore, we sought to perform a formal comparison of inpatient pain management between hematologists and hospitalists to better understand differences and enhance potential insights for improvement of care of patients with SCD.

METHODS

We performed a retrospective analysis of patients with SCD (type SS, SC, S β^0 -thalassemia, and S β^+ -thalassemia) hospitalized for VOC at Duke University. After obtaining approval by the institutional review board with waiver of consent, records were reviewed from September 1, 2008 to January 31, 2011. All inpatient care for patients with SCD moved from the hematologist to the hospitalist service in November 2009. Therefore, patients were under primary care of hematologists prior to November 2009 and cared for primarily by hospitalists beginning in December 2009. The hematologist remained involved as a consult service for specific patients as requested by the hospitalist service. We identified patients through Duke Enterprise Data Unified Content Explorer (D.E.D.U.C.E.), an electronic database of clinical information collected by patient care⁴. Medical records were reviewed and information recorded included ordering practices (hydroxyurea, intravenous fluids, spirometry, bowel regimen, and DVT prophylaxis), patient controlled analgesia (PCA) ordering practices on admission, and outcomes (length of hospitalization including time in emergency department and readmission rates).

Comparisons were made between patients using a Student's t-test for continuous variables, and a Fisher's exact test for categorical variables. For all comparisons, $p < 0.05$ was considered significant and analysis was performed using Graphpad Prism 5 software (Prism 5.0d, November 8, 2010).

RESULTS

Database review revealed 298 patients with SCD admitted for VOC between September 1, 2008 and January 31, 2011, with a mean age of 32 (range 19 to 58). There were 120 patients cared for by hematologists over 13 months and 178 patients by hospitalists over 13 months.

There was no significant difference in standard ordering practices between hematologists and hospitalists. This included similar rates of continuation of Hydroxyurea (HU), use of anti-itching medications, and use of deep venous thrombosis prophylaxis. Both hematologists and hospitalists also equally utilized intravenous fluids, incentive spirometry and preventive bowel regimen (Table 1).

Patients cared for by a hematologist had a higher but non-significant total number of hours on a patient controlled analgesia (PCA) device (212 vs. 171 hours, $p=0.11$). In examining specific ordering practices for PCA, hematologists were significantly less likely to utilize demand only PCA than hospitalists (23% vs. 42%, $p=0.002$) and had a significantly higher rate of using both continuous and demand PCA (67% vs. 54%, $p=0.04$). Although non-significant, hematologists also were more likely to use oral opioid medications alone on admission (13% vs 10%) and begin home oral medications prior to discontinuation of PCA (65% vs. 54%, $p=0.08$) (Table 2). Importantly, patients cared for by hematologists had a significantly longer hospitalization compared to hospitalists (10 vs. 8.4 days, $p=0.04$). Analysis of length of stay for each modality of PCA treatment revealed no difference between hematologist and hospitalist for demand only (8.3 vs. 7.7 days) and a significant difference between patients placed on demand and continuous PCA (11.2 vs. 9.1 days, $p=0.04$) (table 3). Furthermore, there was no significant difference in 7 day readmission rates (6.7% vs. 7.2%) and 30 day readmission rates (35% vs. 40%) (table 3).

DISCUSSION

With improved care for patients with SCD, increasing numbers are surviving into adulthood and this trend has led to increased number of hospitalizations. The use of hospitalists has been increasingly utilized by hospitals to help care for this growing population. Our institution is similar to many other hospitals in transferring care of inpatients with SCD to the hospitalist service. We evaluated the care differences between hematologists and hospitalists caring for patients with SCD admitted for VOC and found similarities and key differences in management of pain.

We found that standard ordering practices did not significantly differ between hematologists and hospitalists. Interestingly, we found DVT prophylaxis to be prescribed by hematologists and hospitalists for the majority of patients (97% and 92%, respectively). The most recent American College of Chest Physicians guidelines do not advocate DVT prophylaxis for patients with SCD without the presence of an additional risk factor⁵. However, our institutional standard order sets include DVT prophylaxis for VOC and likely lead to its increased utilization.

In contrast, significant differences in care practices were noted in pain management of hospitalized patients with VOC. Appropriately, neither hematologists nor hospitalists utilized oral only pain management for acute VOC and very few utilized a continuous PCA without a demand administration. However, hospitalists more often utilized a demand only PCA with continuation of home long acting oral pain medication as compared to hematologists (42% vs. 23%, $p<0.01$).

Ultimately, there was a decrease in length of hospitalization by hospitalists compared to hematologists (8.4 days vs. 10 days, $p=0.03$) with no significant increase in 7 day readmission rates (7.2% vs. 6.7%) or 30 day readmission rates (40% vs. 35%). Interestingly, patients continued on their oral home pain regimen and placed on a demand only PCA had similar length of hospitalization for both hematologists and hospitalists (8.3 vs. 7.7 days). The greater number of patients treated by hospitalists with demand only (42% vs. 23%) potentially led to the overall significant shorter length of hospitalization. This decrease in

length of stay (LOS) emphasizes the possible benefits of using home oral pain medications for long acting pain management as opposed to the use of a continuous PCA. This eliminates the need to transition the patient from intravenous to oral pain medications and likely led to a shorter LOS. The 30 day readmission rates observed in this study, are similar to past studies in which readmission rates were 27–50%^{6,7}.

Clinical management of VOC pain has not significantly changed over the past few decades and as seen in our study, treatment is primarily focused on the use of opioid analgesics. Although there are several treatment guidelines for VOC pain crisis^{8–10}, there have been few studies evaluating the optimal treatment strategies for administering opioid medication. Dampier et al compared two dosing strategies to attempt to determine proper dosing. They randomized 38 adult and pediatric subjects to either higher demand dose with a lower constant infusion (HDLI) or a lower demand dose and higher constant infusion LDHI). A reduction in pain intensity and total opioid utilization were not found to be significantly different in either HDLI or LDHI treatment groups, but the findings were limited due to the slow enrollment and early study termination¹¹. Subsequently, Miller et al reported their results of pain management in patients with SCD enrolled for the Preventing Acute Chest Syndrome by Transfusion feasibility study, which although not designed to assess pain management, provided a ‘snapshot’ of current provider practices. They found that 224 (94%) patients received parental opioid analgesia. Of those, 75 (31.6%) utilized parenteral opioids or PCA with oral opioids and 132 (58.9%) used parenteral opioids only¹². Although this study did not detail whether hospitalists versus hematologists provided inpatient care to patients with SCD, it showed that a majority of providers at various institutions utilized parenteral opioids alone and had similar narcotic ordering practices as the hospitalists in our institution.

Limitations to the present study include the retrospective nature of this study and the potential influence of seasonal variations. In addition, neither the use of PCA nor the PCA changes and weaning were standardized before the study. Therefore, changes made to the PCA during the hospitalization period varied among physicians, and this specific data was not collected due to the numerous types and dosing strategies of opioid medications. Furthermore, we are limited in determining the degree to which factors such as hydroxyurea and use of home oral pain medications prior to discharge influence length of hospitalization. The development of a prospective study would ideally allow a systematic analysis of potential influencing factors.

Finally, the 13 month time period examined for the hospitalists was immediately after the transition from the hematology service. The management by hospitalists during this time period may have potentially changed with the continued care for this specific population of patients. However, this study identified specific care differences in management of VOC pain crisis at our institution, which further support systematic evaluation of opioid management.

Overall, we ascertained significant differences between hematologists and hospitalists in the management of pain for SCD patients admitted for VOC. On admission, hematologists utilized both continuous and demand PCA more often when compared to hospitalists who utilized both home oral pain medications and demand only PCA. The use of home oral opioid medications with demand only PCA may account for shorter hospitalizations and did not lead to a significantly different 7 day or 30 day readmission rate. This study advocates the continued collaboration between hematologists and hospitalists in management of VOC pain crisis. More importantly, opioid pain management practices need to be studied prospectively to attempt to find improved methods for pain control and ultimately a reduction in length of stay in the hospital.

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REFERENCES

1. Steiner, CA.; Miller, JL. Sickle Cell Disease Patients in U.S. Hospitals, 2004: Statistical Brief #21. 2006.
2. Quinn CT, Rogers ZR, Buchanan GR. Survival of children with sickle cell disease. *Blood*. 2004; 103:4023–4027. [PubMed: 14764527]
3. Smith WR, Jordan LB, Hassell KL. Frequently asked questions by hospitalists managing pain in adults with sickle cell disease. *J Hosp Med*. 2011; 6(5):201–303.
4. Horvath MM, Winfield S, Evans S, et al. The DEDUCE Guided Query tool: Providing simplified access to clinical data for research and quality improvement. *J Biomed Inform*. 2011; 44:266–276. [PubMed: 21130181]
5. Guyatt GH, Akl EA, Crowther M, et al. Executive summary: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. *Chest*. 2012; 141:7S–47S. [PubMed: 22315257]
6. Ballas SK, Lusardi M. Hospital readmission for adult acute sickle cell painful episodes: frequency, etiology, and prognostic significance. *Am J Hematol*. 2005; 79:17–25. [PubMed: 15849770]
7. Brousseau DC, Owens PL, Mosso AL, et al. Acute care utilization and rehospitalizations for sickle cell disease. *JAMA*. 2010; 303:1288–1294. [PubMed: 20371788]
8. Trentadue NO, Kachoyeanos MK, Lea G. A comparison of two regimens of patient-controlled analgesia for children with sickle cell disease. *J Pediatr Nurs*. 1998; 13:15–19. [PubMed: 9503762]
9. National Heart Lung and Blood Institute. The management of sickle cell disease. Bethesda, MD: The Institute; 2002. Division of Blood Diseases and Resources; p. xiv-188.
10. Benjamin L. Pain management in sickle cell disease: palliative care begins at birth? *Hematology Am Soc Hematol Educ Program*. 2008:466–474. [PubMed: 19074128]
11. Dampier C, Smith WR, Wager C, et al. Initial Experience with the IMPROVE Trial-a Phase III Analgesic Trial for Hospitalized Sickle Cell Painful Episodes. *Blood*. 2010; 116:1100–1100.
12. Miller ST, Kim HY, Weiner D, et al. Inpatient management of sickle cell pain: a 'snapshot' of current practice. *Am J Hematol*. 2012; 87:333–336. [PubMed: 22231150]

Table 1

Standard Ordering Practices of Hematologists and Hospitalists

	Hematologists	Hospitalists
Continuation of home HU	53%	58%
IVF on admission	85%	96%
Incentive spirometry	65%	58%
Bowel regimen	92%	92%
Anti-itching medication	90%	80%
DVT prophylaxis	97%	92%

HU, hydroxyurea; IVF, intravenous fluids; DVT, deep vein thrombosis

Table 2

Patient Controlled Analgesia (PCA) practices of Hematologists and Hospitalists

Pain Management	Hematologists	Hospitalists
Oral only	0%	0%
Demand only	23%	42% **
Continuous only	10%	4%
Demand + Continuous	67%	54% *
Continuation of home opioid prior to stopping PCA	65%	54%
Total PCA Hours	212	171

**
p<0.01;

*
p<0.05

Table 3

Outcomes for patients with SCD cared for by hematologist and hospitalists

	Hematologists	Hospitalists
Length of hospitalization including ED time (days)		
Overall	10	8.4*
Demand only	8.3	7.7
Continuous only	9.2	8
Demand + Continuous	11.2	9.1*
30 day readmission rate	35%	40%
7 day readmission rate	6.70%	7.20%

ED, emergency department;

*
p<0.05