Emergency Medicine and Health Care
ISSN 2052-6229 | Volume 7 | Article 1

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Original Research Open Access

Procedural pain management in a community emergency department: A pilot study of feasibility and efficacy

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Abstract

Introduction: Pain is a common reason for presentation to the Emergency Department, and non-opioid therapies to relieve pain are desirable. Access to pain management programs may be limited in community hospitals without academic pain medicine training programs. Our objective was to investigate the feasibility of improving non-opioid pain management in a community hospital by providing interventional or procedural pain management in the Emergency Department setting, led by Emergency Physicians.

Methods: This was a pilot study examining the efficacy of pain relief and financial feasibility of an Emergency Physician led procedural pain management program in a community hospital. Two physicians at our hospital were dedicated to pain management procedures in our ED over eight 8-hour ED shifts. Procedures performed included nerve blocks, trigger point injections, cervical injections, and osteopathic manipulation.

Results: Our physicians treated 47 patients with a total of 57 procedures. Average pain score before pain management procedures in the ED was 8.8 out of 10, which decreased to 1.9 out of 10 after the procedure ($p<0.001$). 97.9 % of patients expressed satisfaction with the pain management procedure. Our physicians generated $314.81 in charges per procedure, and averaged 7.1 procedures per shift. Reimbursement for charges depends on payor mix.

Conclusion: Our pilot project of an ED physician-led procedural pain management program was successful in reducing patients' pain, and patients were satisfied with their pain relief from the program. Financial sustainability depends on the volume of procedures done and the payor mix/reimbursement.

Keywords: Emergency Department, Pain, Pain management, Community Hospital

Introduction

Pain is the most common complaint in patients presenting to the Emergency Department, with nearly 80% of ED patients having a complaint of pain [1]. As the United States is in the throes of an epidemic of opiate addiction [2-4], physicians struggle to treat pain without requiring the use of opioids.

Pain medicine is a distinct specialty in medicine, with care usually provided by providers who have completed fellowship training in pain medicine, including interventional (procedural) pain medicine. As defined by the American Board of Pain Medicine,

> *"The specialty of Pain Medicine, or Algiatry, is a discipline within the field of medicine that is concerned with the prevention of pain, and the evaluation, treatment, and rehabilitation of persons in pain"* [5].

Many hospitals have departments or divisions of pain medicine that provide both clinical care to patients and training to physicians. Furthermore,

> *"The pain physician serves as a consultant to other physicians but is often the principal treating physician (as distinguished from the primary care physician) and may provide care at various levels, such as treating the patient directly, prescribing medication, prescribing rehabilitative services, performing pain relieving procedures, counseling patients and families, directing a multidisciplinary team, coordinating care with other health*

 doi: 10.7243/2052-6229-7-1

care providers and providing consultative services"[5].

However, some hospitals – particularly community hospitals without academic training programs–do not have such programs, limiting access to pain medicine providers, resulting in pain management decisions being made by the primary care physicians, emergency physicians, or hospitalists, depending on the setting. While pain management by physicians without a specific background in pain medicine is improving, interventional pain treatments are an important part of non-opioid pain management, and may be limited in clinical settings without access to a pain medicine provider [6].

Fortunately, Emergency Departments have been working to improve pain care with non-opioid pain regimens, including the use of limited interventional pain procedures, which have shown success both in terms of patient satisfaction and relieving pain [7,8]. One US Emergency Department in particular has been extremely successful in promoting non-opioid management, with a focus on procedural pain management – such as nerve blocks and trigger point injections [9]. Along this line, there is increasing interest among Emergency Physicians to obtain new training and skills to improve pain management in the ED [10].

At our hospital, we do not have a formal pain medicine program, but do aim to provide high quality pain management, with an emphasis on non-opioid regimens. Procedural pain management is only done in our ED by physicians who have been trained to perform the procedures. We have 24 Emergency Physicians in our group, yet only two regularly perform nerve blocks, and only six regularly perform any pain management procedures. We sought, in this study, to investigate the feasibility of improving non-opioid pain management in a community hospital by improving access to interventional or procedural pain management in the Emergency Department setting, led by Emergency Physicians. To the best of our knowledge, this is the first study examining the efficacy and financial feasibility of an Emergency Physician led procedural pain management program in a community hospital.

Methods

This study was conducted at a suburban community hospital, with an annual Emergency Department census of approximately 55,000 yearly visits. The hospital does not have a pain medicine department, but does have a Pain Management Workgroup (PMWG). The PMWG is a multi-disciplinary committee tasked with both introducing new and innovative pain management strategies and ensuring patients have access to quality and evidence-based pain management protocols. This project was designed and developed by the PMWG.

The interest in this project came from trying to create and design an inpatient/emergency department pain management service in a community hospital without an existing pain management program. When designing the pilot study, we corresponded with a nearby academic medical center with a robust pain management program – only to find that the program had academic funding, residents, fellows, and medical students – very different from the resources available to a community hospital and community ED. Our goal was to be able to create a procedural pain management service led by Emergency Physicians that would improve access to non-opioid pain relief while being cost-neutral to the organization.

In our Emergency Department, we have two physicians who have particular skills and interests in pain management who volunteered to be a part of our study. One physician is an allopathic trained physician with particular skill from his residency in ultrasound and ultrasound guided nerve blocks. The other physician is an osteopathic trained physician who was also trained in residency on ultrasound guided nerve blocks.

We designed a trial of four eight-hour shifts for each doctor randomly distributed over a two-month period to determine if procedural pain management shifts (in addition to our normally scheduled physicians) would provide effective pain relief to patients and prove to be cost neutral for our ED. We hypothesized that physicians dedicated to providing non-opioid pain management procedures to patients in our ED would improve pain treatment for patients in our ED. We, additionally, hypothesized that the revenue generated by the procedural treatment of pain would generate enough revenue to cover the cost of paying the physicians for their time – and thus be a cost neutral intervention for our ED to improve non-opioid pain management. This study was deemed a program evaluation by the hospital's institutional review board committee, and therefore exempt from its approval. We did not evaluate the effect of the procedural pain management provider on what other treatments a patient received – this was simply a pilot study of feasibility and efficacy of having a dedicated procedural pain management physician working in the ED.

ED staff and providers were notified of the pilot project beginning one month in advance of the start date via email and posted flyers around the Emergency Department. Additionally, on the day of a "pain shift", all of the providers working that day were notified before the shift started via the hospital's secure text messaging system (qliqSOFT, Dallas, TX).

For each of the eight shifts completed by our two physicians, we tracked the number of procedures done, information about the patients treated with each procedure, the patient experience receiving treatment, the billing codes generated for each procedure, and the charges generated by each physician during each shift. The physicians working the procedural pain management shifts were responsible for recording the information as they worked on shift. We scheduled the shifts from 12 pm to 8 pm, to match the times of day at which our department census is highest. We decided a priori that we would not review reimbursement by insurance for each patient in the pilot study when reviewing the data. As payor mix varies day to day, we did not feel that an eight-shift trial

doi: 10.7243/2052-6229-7-1

would be of adequate size to capture the true effect of insurance reimbursement on the cost feasibility of the pilot project. Rather, we planned to look at charges generated and then compare them to overall reimbursement rates averaged over a larger period of time.

Inclusion criteria for referral for evaluation for treatment by one of the procedural pain physicians was any patient in the ED with a painful condition who the treating ED provider thought might benefit from an evaluation by the procedural pain physician. We included any procedure that could help relieve pain in this project, including procedural sedation, pain management procedures (such as nerve blocks or trigger point injections), and reduction of painful orthopedic injuries. Given that we did not want the procedural pain physician to be sitting idle, we also let ED providers know that if there were no pain procedures to be done, the procedural pain physician could also help out with minor procedures in the ED, such as laceration repair or incision and drainage. Notably, the procedural pain physicians did not see patients primarily; they only managed pain and performed procedures. The patients were seen and evaluated by the ED providers normally scheduled for the day, and the procedural pain physicians acted as consultants. Pain procedures were considered adjuncts to standard care.

A list of specific pain management procedures that each physician was able to perform is listed in **Table 1**. Data analysis was done using Microsoft Excel (Microsoft Corp, Redmond, WA).

Results

Between February and March of 2019, our two procedural pain physicians worked a total of eight eight-hour shifts in the ED, for a total of 64 hours of shift time. During those shifts, the two physicians treated 47 patients with a total of 57 procedures. A summary of the patients treated and procedures performed can be found in **Table 2**. There were five patients who were treated with non-pain related procedures by the procedural pain physician when the department was busy; all five of these procedures were laceration repairs. No complications of any of the pain procedures were reported during or after the study.

For each patient receiving treatment, the procedural pain physician assessed pain before and after each pain "consultation" using the 0-10 pain scale. The average pain before treatment by the procedural pain physician was 8.8 out of 10, and the average pain after treatment by the procedural pain physician was 1.9 out of 10. This was found to be significant using a paired students t-test, with $p<0.001$.

Additionally, for each patient receiving treatment, the procedural pain physician assessed whether or not patients were satisfied with the procedural treatment provided. After completing treatment, the procedural pain physician asked patients if they would want to receive similar pain treatment in the future if they presented to the ED with a similar problem. 46 out of 47 patients (97.9%) stated that they felt the procedural pain treatment was effective to the extent that

Table 1. Procedures available to be performed by physicians.

Physician 1 (MD)	Physician 2 (DO)
Nerve block for long bone fracture	Femoral nerve block (hip fracture)
Femoral nerve block (hip fracture)	Scalene block (rib fracture)
Scalene block (rib fracture)	Articular injection
Interscalene block (shoulder, humerus injury)	Shoulder injection for calcific tendinitis
Infraclavicular block (elbow injury)	Occipital injection for headache
Popliteal block (ankle injury)	Osteopathic manipulation
Trigger point injection	Trigger point injection
Cervical injection for headache	--

Table 2. Summary of patients treated and procedures performed (47 patients treated, 57 total procedures performed).

Average age of patients treated	58
Youngest age of patients treated	5
Oldest age of patients treated	95
Number of male patients (% of total)	19 (40%)
Number of female patients (% of total)	28 (60%)
Number of patients treated with trigger point injections (% of total)	24 (51%)
Total number of trigger point injections given	29
Number of ultrasound guided nerve blocks performed (% of total procedures)	4 (7%)
Number of landmark based nerve blocks performed (% of total procedures)	9 (19%)
Number of patients treated with osteopathic manipulation (% of total)	3 (6%)

 doi: 10.7243/2052-6229-7-1

they would want similar treatment in the future if needed. The remaining patient was an older patient with dementia who fell asleep after receiving treatment from the procedural pain physician, and family declined to wake her up when the physician went back to assess satisfaction with treatment.

We, after the shifts were complete, reviewed the billing codes and charges generated by the procedural pain physician. Over the eight shifts worked, 57 procedures were coded, with a total of $17,944.00 in charges billed for the procedures, and an average of $314.81 per procedure. Our physicians were paid an hourly rate of $150 per hour for this pilot study, for a total cost of $9,600.00 to fund the eight shifts.

The number of procedures per shift was variable from day to day. The minimum number of procedures done per shift was four, the maximum number of procedures done per shift was eleven, and the average number of procedures done per shift was 7.1. The number of procedures done per shift did not appear to correlate with how busy the ED was on the day of the pain shift.

Discussion

In general, we found that our pilot project of an ED physician-led procedural pain management program was successful in that it improved patients' pain in a non-opioid fashion and patients were satisfied with the service provided. Additionally, depending on the payor mix and volume of procedures done, such a service may be financially self sustaining.

One major issue in terms of the efficacy of the program was that the volume of procedures done was highly variable between shifts, with the number of procedures done varying between 0.5 procedures per hour and 1.4 procedures per hour. From a resource stewardship standpoint, to create a permanent program of ED physician-led procedural pain management, we would need to determine how to provide the procedural pain physician with a steadier stream of patient care tasks. Possible solutions in this case for us would be to expand the referral base for interventional pain treatment from the ED to the observation unit, and even the inpatient setting based upon demand in each area. In addition, we could pair the procedural pain physician with another obligation that would benefit the Emergency Department, such as a physician in triage or a "proceduralist" role. More research into this area will be required at our institution before we can move to a permanent ED physician-led procedural pain management program.

A second issue in regards to the feasibility of a permanent ED-physician led procedural pain management program is the financial implication of the program. When considering how to generalize the cost feasibility data from our pilot study, we believe that reporting our data as "the cost of the physician" to complete the shift and the charges generated makes the data easiest to generalize. Payor mix is a major determination of reimbursement for charges, with the ratios of private insurance, government payors, and uninsured patients being both the major factor in reimbursement for charges and being widely variable between hospitals and regions [11]. Based on observations by a large ED billing coding company, reimbursement of charges for ED care varies widely between departments, ranging from 15% to as high as 45%. Applying those percentages to our pilot study, at a charge reimbursement rate of 15%, our physicians would have been paid $9600.00 for the shifts, and would have been reimbursed $2691.60 – a clear net loss to the ED. However, at a charge reimbursement rate of 45%, our physicians would have been paid $9600.00 for the shifts, and would have been reimbursed $8074.80 – much closer to cost neutral for the ED. Furthermore, the volume of procedures done plays a role in the cost analysis as well. Since each procedure generated, on average, charges of $314.81, increasing the number of procedures done per shift could shift the balance of cost and reimbursement for the program – making the program financially sustainable.

One other financial concern about this pilot project that should be taken into consideration is how frequently such procedures are already being done in an Emergency Department. For our ED, these pain management procedures are only done by a few physicians and are therefore only currently done when those physicians are working. Being able to offer these procedures on a regular basis increases the frequency of these procedures being done – and therefore generates more revenue from those additional procedures to allow the program to pay for itself. If an ED is already doing such pain procedures on a regular basis without a dedicated pain provider, then the pain provider does not generate more revenue to pay for the program – as those procedures are currently being done and generating reimbursement.

When reviewing the pilot project with staff in our ED after completion, two other benefits were brought up that are worth discussing. First, when patients are treated in the ED with sedating medications for pain or spasm, such as opioids or benzodiazepines, they cannot drive themselves home due to the effects of the medications. Patients often find this frustrating, and our staff expressed patient satisfaction with receiving treatment with non-sedating therapies as a part of this pilot project that still allowed the convenience of driving home. Second, our ED staff also expressed satisfaction with the pilot project, noting the time saved by physicians when another physician could perform a time consuming procedure as well as the overall satisfaction with knowing that our department was providing high quality medical care. This second point may contribute to the financial feasibility of such programs – as having a provider dedicated to pain management procedures allows her or his colleagues to continue seeing patients without having to stop to perform a time consuming procedure.

In summary, for our institution, and for any institution considering a similar program, the creation of a permanent procedural pain management program for the Emergency

doi: 10.7243/2052-6229-7-1

Department will require a formal analysis of the anticipated volume and charge reimbursement percentage to determine financial sustainability.

Limitations

There are several limitations to our study that must be considered. First, our pilot study was small, with only 8 shifts by two doctors and 47 patients. When applied to a larger group of patients, it is possible that our interventional pain procedures might not be as successful as seen in this small pilot study. Additionally, this was an observational study of a pilot project at a community hospital and lacks a control group. It is possible that our patients were biased by the lack of randomization, namely that patients were biased by a physician openly dedicated to their pain relief. It is also possible that the result of a similar study would be different if applied in a different setting than a community hospital. In terms of more specific limitations to our methodology, the procedural pain physician was responsible for assessing the patient's pain before and after the procedure. Having the physician who performed the procedure assessing satisfaction may have biased the patients to report that the intervention was more efficacious. Additionally, we did not review how long the relief from the procedure lasted. We could improve the quality of the data in future studies by having a research assistant perform the pain assessments, and then also having that research assistant follow up with the patient 1-2 days after the procedure as well. Since this was a pilot study designed to provide preliminary information on feasibility, a larger and more comprehensive study could be designed to provide more definitive data on the efficacy of a procedural pain management physician in a community Emergency Department.

Conclusion

In conclusion, we believe that our pilot project of an ED physician-led procedural pain management program was successful in reducing patients' pain in a non-opioid fashion, and patients were satisfied with their pain relief from the program. To move to a permanent program, Emergency Departments will have to analyze their volume and payor mix to determine financial sustainability.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Authors' contributions	CG	TH	RS	ADC	GM	SB	RC
Research concept and design	✓	--	--	--	✓	✓	✓
Collection and/or assembly of data	--	✓	✓	--	--	--	--
Data analysis and interpretation	✓	--	--	✓	--	--	--
Writing the article	✓	--	--	--	--	--	--
Critical revision of the article	✓	✓	✓	✓	✓	✓	✓
Final approval of article	✓	✓	✓	✓	✓	✓	✓
Statistical analysis	✓	--	--	✓	--	--	--

Acknowledgement

The authors wish to acknowledge Kate and Aaron Wolovsky for their support of this project.

Publication history

EIC: Joseph Varon, University of Texas, USA.
Received: 05-Jan-2020 Final Revised: 13-Feb-2020
Accepted: 18-Feb-2020 Published: 29-Feb-2020

References

1. Abdolrazaghnejad A, Banaie M, Tavakoli N, Safdari M and Rajabpour-Sanati A. **Pain Management in the Emergency Department: a Review Article on Options and Methods**. *Adv J Emerg Med*. 2018; **2**:e45. | Article | PubMed Abstract | PubMed FullText
2. Gwira Baumblatt JA, Wiedeman C, Dunn JR, Schaffner W, Paulozzi LJ and Jones TF. **High-risk use by patients prescribed opioids for pain and its role in overdose deaths**. *JAMA Intern Med*. 2014; **174**:796-801. | Article | PubMed
3. Paulozzi LJ, Strickler GK, Kreiner PW and Koris CM. **Controlled Substance Prescribing Patterns--Prescription Behavior Surveillance System, Eight States, 2013**. *MMWR Surveill Summ*. 2015; **64**:1-14. | Article | PubMed
4. Guy GP, Jr., Zhang K, Bohm MK, Losby J, Lewis B, Young R, Murphy LB and Dowell D. **Vital Signs: Changes in Opioid Prescribing in the United States, 2006-2015**. *MMWR Morb Mortal Wkly Rep*. 2017; **66**:697-704. | Article | PubMed Abstract | PubMed FullText
5. American Board of Pain Medicine. **What is Pain Medicine**. 2019. | Website
6. Owen GT, Bruel BM, Schade CM, Eckmann MS, Hustak EC and Engle MP. **Evidence-based pain medicine for primary care physicians**. *Proc (Bayl Univ Med Cent)*. 2018; **31**:37-47. | Article | PubMed Abstract | PubMed FullText
7. Duncan RW, Smith KL, Maguire M and Stader DE, 3rd. **Alternatives to opioids for pain management in the emergency department decreases opioid usage and maintains patient satisfaction**. *Am J Emerg Med*. 2019; **37**:38-44. | Article | PubMed
8. LaPietra AM and Motov S. **A Country in Crisis: Opioid Sparing Solutions for Acute Pain Management**. *Mo Med*. 2019; **116**:140-145. | PubMed Abstract | PubMed FullText
9. **Innovative Program Targets Five Common Pain Syndromes With Non-opioid Alternatives**. *ED Manag*. 2016; **28**:61-6. | PubMed
10. Todd KH. **A Review of Current and Emerging Approaches to Pain Management in the Emergency Department**. *Pain Ther*. 2017; **6**:193-202. | Article | PubMed Abstract | PubMed FullText
11. Wilson M and Cutler D. **Emergency department profits are likely to continue as the Affordable Care Act expands coverage**. *Health Aff (Millwood)*. 2014; **33**:792-9. | Article | PubMed Abstract | PubMed FullText

Citation:
Grover C, Heflin T, Smith R, Chato AD, Molina G, Burnell S and Close R. **Procedural pain management in a community emergency department: A pilot study of feasibility and efficacy**. *Emerg Med Health Care*. 2020; **7**:1. http://dx.doi.org/10.7243/2052-6229-7-1