ISP Project

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Title:
Psychosocial Factors Affecting ED MR Spine Use for Lower Back Pain

Abstract:
Despite evidence-based literature and society guidelines regarding appropriateness of MR imaging in the setting of low back pain, there continues to be a high utilization of MR scans of the lumbar spine in the emergency department setting. An IRB-approved 2 year retrospective review was performed of the imaging and electronic health record at a regional academic medical center encompassing 2 EDs to compare demographic, exam and "soft" factors that may explain pressure or expectation for MR imaging in the ED setting. Our goal is to create a novel model to identify the qualitative factors that effect physician imaging ordering behavior in the ED and extrapolate them into quantifiable data points that can be objectively compared. The results of this project will help us better understand the nuances of the physician-patient relationship in the ED and allow us to build imaging protocols that reflect the complexity of care provided in the emergency department setting.

Background

At any given time over 31 million Americans suffer from low back pain and it is one of the most common complaints seen in the Emergency Department. Most forms of back pain are self-limited and resolve with conservative management within six weeks. However, immediate intervention may be required in some cases. The increasing accessibility of advanced imaging such as MR imaging in the ED setting continues to change how these patients are evaluated. However, routine MR imaging for lower back pain has been shown to not be associated with any clinically meaningful effect on patient outcomes [1]. In fact, increasing rates of spine imaging have been shown to correlate with additional tests, follow-ups and referrals as well as increased rates of lumbar surgery [2]. Additionally, MRIs may reveal abnormalities in asymptomatic patients.

In 2006, back-pain patients seen in the emergency department were three times more likely to get a CT scan or MRI than similar patients in the year 2002[5]. Although rates can vary based on insurance status, geographic location and other factors, lumber spine CTs are 5 to 10 times more expensive than lumbosacral spine plain radiography and MRI costs run 10 to 15 times higher[6]. Given these findings and the costs associated with imaging, current American College of Radiology (ACR) guidelines recommend that imaging modalities like the MRI only be used in the presence of certain "red-flags" that significantly increase specificity[7], including known malignancy, suspected infection, or the presence of severe or progressive neurological deficits.

While it is evident that emergent MR evaluation in the ED continues to be requested outside of guidelines[8], the reasons behind this rise still remain elusive. Suggested factors include financial incentives [9], defensive medicine[10], time management[11] and physician incentives to improve patient satisfaction[12]. In addition to these factors, ED physicians face a unique set of pressures specific to their environment. One of these includes the interaction with the "undifferentiated patient", i.e. a patient who does not have a clear pre-hospital diagnosis prior to ED arrival. The qualitative and often subtle nature of this relationship makes studying its impact on physician ordering behavior difficult.

Our study aims to create a model by which such qualitative and subjective 'soft' factors can be compared objectively using quantitative methods. We hope use this technique to evaluate nuances of the emergency physician-patient dynamic and psychosocial factors that influence emergency physician ordering of lumbar spine MRIs.

Methods:

Institutional IRB approval was obtained for a retrospective review of the Radiology and Electronic Medical record from 01/02/2012 and 3/10/2014 to identify patients who presented to either of the 2 UC San Diego Health Emergency Departments (ED) for evaluation of low back pain. All patients who had lumbar spine MR imaging, without and/or with contrast, constituted one cohort. The comparison cohort was derived from comparable (age, gender-matched, etc.) patients who presented in the same time period with lower back pain, but did not have lumbar spine MR imaging associated with that encounter. Data points are detailed in Table 1. Service-related psychosocial factors in the study include amount of time spent in the waiting room, degree of perceived pain by patient, patient narcotic requirement, referral pressure, expectation pressure, history of prior lumbar imaging, patient satisfaction with level if care received, and patient difficulty getting appropriate care. These were derived from the clinical experience of ISP committee members, editorials in the lay press about the subject (e.g., http://content.time.com/time/health/article/0,8599,2053354,00.html) and screening of emergency-medicine focused internet blogs and chat on the topic (e.g., http://www.kevinmd.com/blog/2012/07/recommendations-choosing-wisely.html).

An innovation in this study was the use of qualitative end-points, which can be challenging to collect in a robust and consistent manner. To address this, a case-based, demonstrative, rubric was created to define nuances of the ED physician-patient interaction and standardize the data collection process among involved data abstractors (see attached appendix). A manual chart review was then performed to identify any of these factors related to the specific ED encounter. The identified "soft factors" were then used to answer specific quantifiable questions thereby allowing qualitative information to be converted to quantifiable data points that can be further studied using objective statistical models (Figure 2).

Next Steps:

Data is currently in the process of being abstracted from patient charts in EPIC. Some objective data points can be abstracted automatically using queries in

EPIC where as other, more qualitative data points require manual abstraction using the standardization protocols derived from the data-collection rubric. Once all the collected information from both cohorts is converted into objectively measurable data points using the RedCap data abstraction form, statistical models can be run comparing each of the factors in the MRI and non-MRI cohorts data obtained from this project will likely will be published. It is our hope that the information gleaned into this project will help us better understand the nuanced factors that affect decision-making in the emergency department setting, both for imaging purposes and for a variety of other related tasks.

References:

1. Chou R. EAAPS. Clinical Guidelines Diagnosis and Treatment of Low Back Pain : A Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society. *Ann Intern Med*. 2007;147(July):478-491.

2. Deyo R a. Cascade effects of medical technology. *Annu Rev Public Health*. 2002;23:23-44. doi:10.1146/annurev.publhealth.23.092101.134534.

3. Boden SD, Davis DO, Dina TS P, Nj WS. Abnormal magnetic resonance scans of the lumbar spine in asymptomatic subjects. *J Bone Jt Surg Am*. 1990;72:403-408.

4. MC J. Classification of protrusions vs extrusions m. *N Engl J Med*. 1994;331:69-73.

5. Friedman BW, Chilstrom M, Bijur PE, Gallagher EJ. Diagnostic testing and treatment of low back pain in United States emergency departments: a national perspective. *Spine (Phila Pa 1976)*. 2010;35(24):E1406-E1411. doi:10.1097/BRS.0b013e3181d952a5.

6. Chou R, Deyo R a., Jarvik JG. Appropriate Use of Lumbar Imaging for Evaluation of Low Back Pain. *Radiol Clin North Am*. 2012;50(4):569-585. doi:10.1016/j.rcl.2012.04.005.

7. Radiology AC of. *American College of Radiology ACR Appropriateness Criteria: Low Back Pain*.; 2011. http://www.acr.org/~/media/ACR/Documents/AppCriteria/Diagnostic/LowBackPain.pdf.

8. Emery DJ, Shojania KG, Forster AJ, Mojaverian N, Feasby TE. Overuse of magnetic resonance imaging. *JAMA Intern Med*. 2013;173(9):823-825. doi:10.1001/jamainternmed.2013.3804.

9. Mitchell JM. Do financial incentives linked to ownership of specialty hospitals affect physicians' practice patterns? *Med Care*. 2008;46(7):732-737. doi:10.1097/MLR.0b013e31817892a7.

10. Studdert DM, Mello MM, Sage WM, et al. Defensive medicine among high-risk specialist physicians in a volatile malpractice environment. *JAMA*. 2005;293(21):2609-2617. doi:10.1097/01.sa.0000204705.79692.d7.

11. Is Time Management an Important Cause of Excessive Imaging? *Back Lett*. 2009;24(5):50. doi:10.1097/01.BACK.0000351388.50216.23.

12. Pham HH, Landon BE, Reschovsky JD, Wu B, Schrag D. Rapidity and modality of imaging for acute low back pain in elderly patients. *Arch Intern Med*. 2009;169(10):972-981. doi:10.1001/archinternmed.2009.78.

Table 1:

SERVICE-RELATED / PSYCHOSOCIAL FACTORS	DESCRIPTION
Amount of time spent in the waiting room	Triage to in-room time
Degree of Pain	Area under curve of pain scores over time
Narcotic requirement (Morphine, Codiene, Hydromorphone, Fentanyl, Hydrocodone, Oxycodone)	Narcotic use prior to ED arrival
	Total amount of narcotic administration prior to MRI
Referral Pressure	Referred to ED by another provider
	Referred to ED by another provider specifically for MRI
Expectation Pressure	Recent healthcare visit for the same problem
	Mention of possibility of getting MRI by patient or family member
Prior Imaging (Lumbar X-Ray, CT or MRI)	Imaging in last 1 month (noted for presence of pathology)
	Imaging over 1 month ago (noted for presence of pathology)
Dissatisfaction with getting care	Patient unhappy with care received, is frustrated or confrontational
Difficulty Getting Care	Unable to see outpatient specialist (lack of access, transportation issue etc)
	Unable to get planned MRI (logistics, timing, distance etc)