



Original Contribution

Imaging during low back pain ED visits: a claims-based descriptive analysis ☆☆☆



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ABSTRACT

Objective: Low back pain (LBP) is a common reason for emergency department (ED) visits. This study aimed to determine the frequency and type of nonindicated imaging during LBP ED visits and to describe demographic and prior health care use characteristics among the nonindicated population.

Methods: This study included index ED events for LBP occurring during 2011 through 2012 for Blue Cross Blue Shield of Michigan commercial members ages 18 to 64 years. We identified LBP imaging indications within 12 months before the index event. Frequency estimates of patient demographics, imaging prevalence, type of imaging, and prior health care use characteristics stratified by imaging and indication status are presented with 95% confidence intervals (CIs).

Results: Of the 14838 total events, 51.9% (95% CI, 51.1%–52.7%) did not have indications for imaging. Patients without imaging indications were less likely to have had ED visits, hospital stays, LBP, lower back imaging, primary care physician visits, and back-related specialist visits in the past year compared with patients with indications. Among nonindicated patients, 30.1% (95% CI, 29.1%–31.1%) received imaging; of these, 26.2% received advanced imaging (computed tomography or magnetic resonance imaging). Nonindicated patients who received imaging were slightly older than those who did not receive imaging (27.6% [95% CI, 25.8%–29.4%] were ages 55–64 years vs 20.6% [95% CI, 19.6%–21.7%]) and had a higher prevalence of observation/treatment room use (7.3% [95% CI, 6.2%–8.4%] vs 1.2% [95% CI, 0.9%–1.4%]).

Conclusions: Our results suggest that a substantial proportion of the patient population presenting to the ED for LBP receives nonindicated imaging, revealing opportunities to reduce costs and radiation exposure.

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1. Introduction

Low back pain (LBP) is a common reason for visiting an emergency department (ED), accounting for almost 3 million patient visits to American hospital EDs annually [1]. The goals of ED evaluation are to relieve pain and diagnose potential life- or limb-threatening conditions that manifest as acute back pain. In most cases, uncomplicated acute LBP, with or without radiculopathy, is a benign, self-limited condition that can be managed without the use of imaging studies. Nevertheless, more than 30% of ED patients with back pain had x-rays in 2006, and nearly 10% underwent advanced spine imaging procedures such as computed tomography (CT) or magnetic resonance imaging (MRI),

representing a 3-fold increase over 4 years in the use of these expensive high-technology studies [1]. Published reviews list standard indications for LBP imaging, known as “red flag” conditions [2].

Reducing unnecessary diagnostic imaging in patients with back pain who lack evidence-based indications for imaging (ie, “nonindicated imaging”) would likely decrease patient exposure to radiation, reduce health care costs, and improve ED efficiency. Recommendations for appropriate use of LBP imaging have been offered by diverse groups, including medical specialty societies (the American College of Physicians [3], the American College of Radiology [4], and the American Academy of Family Physicians [5]), a consortium of health plan medical directors [6], and an expert panel of emergency medicine physicians [7]. In addition, a consumer-friendly guideline on back pain imaging is available [8]. There is a national focus on evaluating appropriateness of imaging for cases of LBP as evidenced by the National Quality Forum–endorsed measure Use of Imaging Studies for Low Back Pain established by the National Committee for Quality Assurance (NCQA) for the Healthcare Effectiveness Data and Information Set (HEDIS) [9]. Use of this measure promotes avoidance of ordering diagnostic imaging in the first 4 weeks of new-onset LBP in the absence of red flags.

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To date, there have been no published descriptive studies of the factors associated with nonindicated imaging for patients with acute LBP at the level of the health plan. Awareness of such factors might be useful to clinicians, quality improvement specialists, health plans, and medical specialty groups to develop targeted interventions aimed at reducing the rate of nonindicated imaging and the consequent costs.

The purpose of this study was to describe demographic and health care use characteristics associated with nonindicated imaging among patients presenting to the ED with LBP, using claims-based data from a large commercial insurer.

2. Methods

2.1. Data sources

This study used data for commercially insured members of Blue Cross Blue Shield of Michigan (BCBSM), who represent approximately 40% of Michigan residents. Demographic (age, sex) and enrollment information was obtained from historic administrative membership enrollment data. All other data came from administrative facility and professional claims, which include hospitalizations, ED visits, other facility visits, and office visits. Diagnoses were identified through *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* codes; procedures were identified using Current Procedural Terminology (CPT) codes, available on claims.

2.2. Study population

The eligible study population included members with an ED visit for a primary diagnosis of LBP during 2011 through 2012. Based on the 2012 specifications for the NCQA for HEDIS metric Use of Imaging Studies for Low Back Pain [9], diagnosis codes included 721.3x, 722.10, 722.32, 722.52, 722.93, 724.02, 724.03, 724.2x, 724.3x, 724.5x, 724.6x, 724.7x, 738.5x, 739.3x, 739.4x, 846.x, and 847.2x. ED visits were defined by the following revenue codes on facility claims: 0450 to 0455, 0457 to 0459, 0981. Members were restricted to those aged 18 to 64 years on the date of the ED event with continuous medical coverage during the preceding 58 weeks, defined by HEDIS specifications as having no gaps in coverage of more than 45 days, and no more than 1 gap of 45 days or less. Continuous medical coverage was required to identify members' imaging indications, ED visit characteristics, and prior health care use. We used only the index event for each member; index events were excluded if they were treated at multiple facilities or if the member was admitted to the hospital for an inpatient stay on the same day or 1 day after the ED visit.

2.3. Imaging indications

Based on national specifications [4,9] and clinical expertise from emergency medicine and orthopedic specialists, we expanded upon the list of red flag conditions to characterize LBP imaging indications as evidence (ie, at least 1 applicable diagnosis code or procedure code on at least 1 facility or professional claim) of any of the following conditions and procedures within 365 days before the index ED event: cancer, trauma, intravenous drug abuse, neurologic impairment, osteoporosis, compression fracture, ankylosing spondylitis, rheumatoid arthritis, or low back surgery. See Supplemental Table 1 for CPT and ICD-9-CM diagnosis and procedure codes.

2.4. Imaging and ED visit characteristics

Imaging procedures were identified for x-ray and advanced imaging (CT and MRI) using CPT codes and revenue codes according to the definition provided in the NCQA HEDIS metric for Use of Imaging Studies for Low Back Pain [9]. The HEDIS specifications include codes for imaging of the cervical, thoracic, and lumbar spine; for the present study, we

limited analysis to imaging procedures of the lumbar spine, which include CPT codes 72010, 72020, 72100, 72110, 72114, 72120, 72131, 72132, 72133, 72148, 72149, 72158, 72200, 72202, and 72220. To be counted as an imaging study, CPT codes on facility claims had to occur along with 1 of the following revenue codes (per HEDIS specifications): 0320, 0329, 0350, 0352, 0359, 0610, 0612, 0614, 0619, 0972.

Events were considered potentially acute if the patient (1) had no claims with a diagnosis of LBP within the 365 days before the event or (2) had 1 or more claims with any diagnosis of LBP in the 6 weeks before the index event but no claims with a diagnosis of LBP in the 365 days before that earlier event. We used a 6-week window to align with the American College of Radiology Appropriateness Criteria for LBP [4], which states that imaging may be considered in patients whose symptoms do not improve after 6 weeks. Events were considered to include observation/treatment room use if the patient had 1 or more facility or professional claims with a CPT procedure code (G0378, G0379, 99217-99220, 99224-99226, 99234-99236) or a revenue code (0760, 0761, 0762) for observation/treatment occurring on the same day or 1 day after the ED LBP event.

2.5. Facility information

We collected basic information about the facilities where the ED events occurred: urbanicity was defined based on the proportion of residents in the facility's ZIP code who live in urbanized areas based on the 2010 US census. Critical access hospitals (CAHs) were identified based on a list from Michigan State University's Michigan Center for Rural Health [10]. Critical access hospitals are small rural hospitals that may differ from larger, more urban hospitals with respect to the patient population and available resources such as advanced imaging technology.

2.6. Prior health care use

We also extracted details about prior health care use in the 365 days before the LBP ED event including a history of LBP, lower back imaging, ED visits, inpatient admissions, primary care physician (PCP) visits, and back-related specialist visits. Lower back pain, lower back imaging, and ED visits were defined using codes as stated above occurring on at least 1 professional or facility claim. Inpatient admissions required at least 1 claim with an inpatient place of service. Primary care physician and back-related specialist visits were defined by at least 1 professional claim with "doctor's office" as the place of service and a rendering practitioner identified as a PCP (ie, credentialed or self reported as pediatrics, internal medicine, family medicine, general practice, geriatric medicine, or adolescent medicine) or a back-related specialist (ie, credentialed as chiropractor, orthopedist, sports/physical medicine, or independent physical therapist), respectively.

2.7. Descriptive analysis

For our analysis, we determined the population distribution for demographic characteristics, prior health care use, and frequency and type of imaging stratified by indication status. For the population with indications for imaging services, we described the indications by imaging status. For the nonindicated population, we described demographics and prior health care use stratified by imaging status and imaging type. Frequency estimates are presented with 95% confidence intervals. All analyses were performed in SAS 9.3 (SAS Institute, Cary, NC).

3. Results

3.1. Overall study population

Overall, 14838 index ED events for LBP during the study period were identified for analysis. Of these, 52.8% were for female patients, and the median age was 46 years. Nearly half (48.1%) of patients were indicated

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