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Research Paper Review

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Association of Early Imaging for Back Pain with Clinical Outcomes in Older Adults

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Jarvik JG, Gold LS, Comstock BA, et al.

Reviewed by Dr. Jeff Muir DC (Research Review Service)

ABSTRACT

IMPORTANCE: In contrast to the recommendations for younger adults, many guidelines allow for older adults with back pain to undergo imaging without waiting 4 to 6 weeks. However, early imaging may precipitate interventions that do not improve outcomes.

OBJECTIVE: To compare function and pain at the 12-month follow-up visit among older adults who received early imaging with those who did not receive early imaging after a new primary care visit for back pain without radiculopathy.

DESIGN, SETTING, AND PARTICIPANTS: Prospective cohort of 5239 patients 65 years or older with a new primary care visit for back pain (2011-2013) in 3 US health care systems. We matched controls 1:1 using propensity score matching of demographic and clinical characteristics, including diagnosis, pain severity, pain duration, functional status, and prior resource use.

EXPOSURES: Diagnostic imaging (plain films, computed tomography [CT], magnetic resonance imaging [MRI]) of the lumbar or thoracic spine within 6 weeks of the index visit.

PRIMARY OUTCOME: back or leg pain-related disability measured by the modified Roland-Morris Disability Questionnaire (score range, 0-24; higher scores indicate greater disability) 12 months after enrollment.

RESULTS: Among the 5239 patients, 1174 had early radiographs and 349 had early MRI/CT. At 12 months, neither the early radiograph group nor the early MRI/CT group differed significantly from controls on the disability questionnaire. The mean score for patients who underwent early radiography was 8.54 vs 8.74 among the control group (difference, -0.10 [95% CI, -0.71 to 0.50]; mixed model, P = .36). The mean score for the early MRI/CT group was 9.81 vs 10.50 for the control group (difference,-0.51 [-1.62 to 0.60]; mixed model, P = .18).

CONCLUSIONS AND RELEVANCE: Among older adults with a new primary care visit for back pain, early imaging was not associated with better 1-year outcomes. The value of early diagnostic imaging in older adults for back pain without radiculopathy is uncertain.

Authors' Affiliations: Departments of Radiology, Neurological Surgery, Health Services, Biostatistics, Psychiatry and Behavioral Sciences, Rehabilitation Medicine, Pharmacy – University of Washington, Seattle; Comparative Effectiveness, Cost and Outcomes Research Center, University of Washington, Seattle; Department of Anesthesiology, Perioperative and Pain Medicine, Brigham and Women's Hospital and Spine Unit, Harvard Vanguard Medical Associates, Boston, Massachusetts; Neuroscience Institute, Henry Ford Hospital, Detroit, Michigan; Division of Research, Northern California Kaiser Permanente, Oakland; Rehabilitation Medicine Department, Mark O. Hatfield Clinical Research Center, National Institutes of Health, Bethesda, Maryland; Department of Neurosurgery and the Center for Health Policy and Health Services Research, Henry Ford Health System, Detroit, Michigan; Department of Family Medicine, Internal Medicine, and Public Health and Preventive Medicine, and the Oregon Institute for Occupational Health Sciences, Oregon Health and Science University, Portland.

BACKGROUND INFORMATION

Generally speaking, the majority of guidelines dealing with acute or chronic back pain feature relatively young age groups. There are fewer guidelines for patients over the age of 65, although a popular clinical approach for this patient population is to introduce early imaging for back pain, with the intention of identifying potentially significant underlying pathologies. However, the evidence supporting this approach is not robust (1), with a recent Cochrane review concluding that the older population is "under-represented" in the back pain literature (2).

Given the high prevalence of incidental imaging findings in older patients, introducing imaging into the early stages of treatment may lead to a cascade of subsequent interventions that serve to increase healthcare costs without clear or relevant benefit to the patient (3, 4). With this in mind, the authors of this paper sought to examine the rate of healthcare usage and the effect of early imaging on patients aged 65 and over who presented for treatment of a new episode of low back pain. They hypothesized older adults who underwent imaging in the first 6 weeks following presentation would have worse outcomes and greater health care usage in the subsequent year.

PERTINENT RESULTS

Study Population:
From a database of over 5200 patients, it was found that 1264 (24%) patients received early imaging (via plain film radiographs). Of these, 1174 were matched for comparison. 366 patients (7.5%) received early MRI/CT; 349 were matched. The baseline characteristics of the propensity-matched participants who underwent early diagnostics did not differ statistically or clinically from those who did not.

Primary Outcomes:

- No statistically significant or clinically important differences were noted in the Roland-Morris scores between those who received early imaging and those who did not.
- Patients receiving early imaging had lower leg pain severity scores at 3, 6 and 12 months as compared with those who did not receive imaging. These findings were statistically significant but not clinically important.
- The 12-month differences between early radiograph patients and controls for other secondary outcomes were extremely small and not statistically significant.
- Patients receiving early advanced imaging (MRI/CT) had statistically significant but not clinically important differences in 6 month leg pain VAS and 12 month EuroQol scores versus those who did not receive imaging.

Healthcare Usage:
There were marked differences in 1-year resource use and costs in patients receiving early imaging versus those who did not. Mean total relative value units (RVUs) were approximately 40% higher ($p < 0.001$) in the early radiograph and 50% higher ($p = 0.01$) in the early MRI/CT group than in the no early imaging or no imaging groups; overall costs were 27%($p < 0.001$) and 30% ($p < 0.04$) higher in early imaging versus no imaging groups; 1-year payouts were $1380 higher (95% CI: $692-2060), for patients with early radiographs and $1430 higher (95% CI: $36.8-2820) for patients with early MRI/CTs There were no differences in the rate of cancer diagnosis in the group receiving early imaging versus those who did not.

CLINICAL APPLICATION & CONCLUSIONS

Although most guidelines and general clinical experience dictates that imaging should be part of the diagnostic process in older patients, there is little evidence to support this practice. This study indicates that the rate of diagnosis of serious, underlying diseases is not increased with early imaging; the patient-related outcomes are not improved with early imaging; and the subsequent healthcare costs are greater in patients receiving early imaging, with no patient benefit realized for this greater expenditure.

The evidence suggests that among older adults with a new case of back pain, early imaging is not necessary and is not associated with better 12-month outcomes.

STUDY METHODS

Study Design:
This was a prospective, observational cohort of patients who received imaging within the first 6 weeks following initial presentation for back pain as compared to a matched cohort who did not undergo imaging.

Setting and Participants:
Patients were drawn from the BOLD (Back Pain Outcomes Using Longitudinal Data) cohort (5, 6). 5238 patients aged 65 years and older who were initiating a new episode of care for back pain were included.

Three clinical sites were utilized: Harvard Vanguard, Henry Ford Health System, and Kaiser Permanente Northern California.

Patient demographics: duration of current episode of back or leg pain (< 1 month, 1-3 months, 3-6 months, 6-12 months, 1-5 years, > 5 years); and recovery expectations (confidence that their pain would be completely gone or much better in 3 months, on a scale from 0 "not at all confident" to 10 "extremely confident").

Primary outcomes: Roland-Morris Disability Questionnaire; back and leg pain severity; Brief Pain Inventory (BPI) interference scale; the Patient Health Questionnaire (PHQ-4), the EuroQol 5D health status questionnaire; and a falls measure (patient-reported falls in the previous 3 weeks).

Electronic Health Record Data:
Electronic health record (EHR) data was used to calculate relative value units (7-9) and assess resource use. Patient data was obtained for the 365 days prior to and immediately following the index visit (or until a patient died or withdrew from the study). Current Procedural Terminology (CPT) codes and/or ICD-9 codes were used to identify procedures.

Early Imaging Group
Patients undergoing imaging within 6 weeks of their index visit were considered to have had "early imaging" (10). Two cohorts were identified: those receiving plain film imaging and those receiving advanced imaging (MRI, CT).

Control Group
A propensity-matched group from the BOLD cohort who did not undergo imaging within the first 6 weeks following the index visit was used as the control group.

STUDY STRENGTHS / WEAKNESSES

Strengths
- The study population was appropriate and sufficiently sized to provide valid findings.
- Patients in the imaging group were appropriately matched to allow for a valid comparison.
- Calculations of healthcare usage and costs were relevant and appropriate.

Limitations
- There is the potential for confounding by indication (i.e. patients receiving early imaging had worse prognoses than patients not getting early imaging).
- Patient characteristics varied by site, which could introduce another source of confounding/bias.
- Baseline measures were administered up to 3 weeks after the index visit and thus could reflect responses to therapy since the index visit.
- Patients who are more likely to ask for early imaging might also be more likely to use resources subsequently.

Additional References:

1. Paeck T, Ferreira ML, Sun C, et al. Are older adults missing from low back pain clinical trials? Arthritis Care Res (Hoboken) 2014; 66(8): 1220-1226.
2. Bressler HB, KeyesWJ, Rochon PA, Badley E. The prevalence of low back pain in the elderly. Spine 1999; 24(17): 1813-1819.
3. Graves JM, Fulton-Kehoe D, Jarvik JG, Franklin GM. Early imaging for acute low back pain. Spine 2012; 37(18): 1617-1627.
4. Webster BS, Cifuentes M. Relationship of early magnetic resonance imaging for work-related acute low back pain with disability and medical utilization outcomes. J Occup Environ Med 2010; 52(9): 900-907.
5. Jarvik JG, Comstock BA, Bresnahan BW, et al. Study protocol: the Back Pain Outcomes using Longitudinal Data (BOLD) registry. BMC Musculoskelet Disord 2012; 13(1): 64.
6. Jarvik JG, Comstock BA, Heagerty PJ, et al. Back pain in seniors. BMC Musculoskelet Disord 2014; 15: 134.
7. Centers for Medicare & Medicaid Services. Medicare program; payment policies under the physician fee schedule, five-year review of work relative value units, clinical laboratory fee schedule: signature on requisition, and other revisions to part B for CY 2012. Fed Regist 2011; 76(228): 73026-73474.
8. Centers for Medicare & Medicaid Services. Medicare program; payment policies under the physician fee schedule and other revisions to Part B for CY 2011. Fed Regist 2010; 75(228): 73169-73860.
9. Medicare program; payment policies under the physician fee schedule and other revisions to Part B for CY2010. Fed Regist 2009; 74(226): 61737-62188.
10. Martin B, Mirza SK, Lurie JD, Tosteson ANA, Deyo RA. Validation of an administrative coding algorithm to identify back-related degenerative diagnoses. Paper presented at: International Society for the Study of the Lumbar Spine (ISSLS); May 14, 2013; Scottsdale, AZ.