Reviewer's report

Title: Implications of Early and Guideline Adherent Physical Therapy for Low Back Pain on Utilization and Costs

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Reviewer: Brook Martin

Reviewer's report:

Thank you for inviting me to review the manuscript "Implications of Early and Guideline Adherent Physical Therapy for Low Back Pain on Utilization and Costs". This interesting and well-written manuscript examine claims data from a large Military Health System electronic medical record. The authors used diagnosis and procedure codes from the International Classification of Disease 9th revision and Current Procedural Terminology codes to identify patients with low back pain and then characterize the use of physical therapy. They examined the types and timing of PT in relationship to current recommendations. The primary conclusion was that early use of PT was associated with significantly lower rates of subsequent health care utilization and cost.

The strengths of the study include the large data set and the appropriate statistical analysis. The appropriately included the ICD and CPT codes that they used to select the cohort. They also did not nice job of summarizing existing literature in this area. My only suggestions involve minor or discretionary revisions:

Minor or discretionary revisions:

Limitations include reporting the validity and reliance of using ICD-9 codes to identify patients with general low back pain. In particular, many patient who have codes for "non-specific" types of low back pain also have codes for more specific types of back pain (e.g. spinal stenosis). It is not clear the the PT guidelines apply to more specific forms of back pain that they apparently have not excluded.

Because the design of the study is observational, there is a high probability of selection by indication bias. Patients who are more enthusiastic about PT, less enthusiastic about interventional therapy, or who have milder or less specific form of back pain are more likely to receive PT and early PT. To help account for this selection bias, the authors should consider first apply more rigorous selection criteria to exclude patients who have co-existing codes for specific forms of back pain (e.g. spinal fracture, SCI, spondylolisthesis, scoliosis). They might also consider propensity-score matching approaches to limit the comparison groups to patients who are within the same region of support. This approach helps account for differences in selection bias, but not unobserved confounding. They should improve the discussion of the limitation that unobserved differences in patient characteristics or pathology may account for the changes that they observed.
The authors should also consider improving their summary and analysis of the imaging recommendations. In their study, the authors use imaging as an outcome to test whether PT use obviates imaging (it does - with a big effect). However they did not provide an overall estimate of the rate of “inappropriate” imaging. Most imaging appropriateness guidelines in back pain do not apply to those over age 50 years, or those who have "red flag" for serious problems. They are intended for non-specific back pain, not for those with specific spinal pathology. The authors somewhat overly-simplify these imaging recommendations by stating that clinical guidelines suggest to "avoid advanced imaging procedures "

With minor revision this manuscript would make a meaningful contribution to the field of back pain and the authors should be congratulated on a very nice study.

**Level of interest:** An article of outstanding merit and interest in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**

I declare that I have no competing interests. I acknowledge that I received salary support from NIH and AHRQ for grant related research work on low back pain, paid directly to my institution.