

Editor's Spotlight/Take 5

Editor's Spotlight/Take 5: Magnetic Resonance Imaging of the Hip: Poor Cost Utility for Treatment of Adult Patients With Hip Pain

Seth S. Leopold MD

The pressure to justify medical tools and interventions in terms of their cost effectiveness intensifies with each passing year.

Note from the Editor-In-Chief: In "Editor's Spotlight," one of our editors provides brief commentary on a paper we believe is especially important and worthy of general interest. Following the explanation of our choice, we present "Take Five," in which the editor goes behind the discovery with a one-on-one interview with an author of the article featured in "Editor's Spotlight."

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Generally, our specialty has responded with good-quality research demonstrating that orthopaedic interventions do not just add quality to patients' years [3, 4], they also justify society's investments in those interventions [2, 5].

But it is equally important that we identify when the tools and interventions used in the care of patients with musculoskeletal diseases and pain are inefficient, ineffective, or do not return on the investments made. Failing to do so will result in those outside our profession perceiving this line of research to be little more than a self-serving form of political action.

In this issue of *Clinical Orthopaedics and Related Research*®, Dr. James A. Keeney (Fig. 1) and his team draw our attention to our usage of MRI of the adult hip, a test that is both commonly employed and very sensitive, but one that also — if used indiscriminately — can result in misdiagnosis, additional (unhelpful) testing, and needless expense. The implications of their work go far beyond the world of hip surgery. If you practice orthopaedic surgery, this article is for you.

Dr. Keeney's team created a clever (and generous) approach to defining

cost-utility that involved defining an "impact study" as an MRI that influenced a treatment decision. To determine cost-utility, Keeney and colleagues multiplied a realistic cost-estimate by the numbers of studies ordered, then divided that product by the number of impact studies identified based on a review of patients' medical records who underwent the test. Perhaps unsurprisingly, researchers found evaluating nonspecific "hip pain" with an MRI as extremely inefficient: USD 59,000 per impact study, compared to USD 3250 when a specific diagnosis indicated the study, and USD 750 when physicians used MRIs in the management of neoplastic conditions. The cost-utility was more than USD 11,000 per study when nonorthopaedists ordered the MRIs — more than three times more expensive compared to when an orthopaedic surgeon ordered the MRI. This difference may be caused by difficulties that nonspecialists have in properly evaluating the adult hip.

Work like Dr. Keeney's study is important to us, even if we thought we "knew" this already. Many surgeons work in systems that lump musculoskeletal providers of all sorts —

Editor's Spotlight/Take 5



Fig. 1 Dr. Keeney and his team created a clever approach to defining cost-utility that involved defining an “impact study” as an MRI that influenced a treatment decision.

primary care physicians, physiatrists, urgent care professionals, as well as orthopaedic surgeons — into one service line (or some other horizontal organizational structure, in contrast to the more-traditional “department” structure that contained only surgeons), and that service line is expected to treat the diagnoses in its purview efficiently and effectively. But even for those who are not in such a system, physicians no longer have the luxury to practice ignorant of the economics of the choices we make.

The work by Dr. Keeney and colleagues can, and must, drive rational practice guidelines for the use of the tools we use. Please read this paper, whether or not you treat adult patients with hip pain, and join me for a fascinating interview with its lead author.

Take 5 Interview with Dr. James A. Keeney, lead author of “Magnetic Resonance Imaging of the Hip: Poor Cost Utility for Treatment of Adult Patients With Hip Pain”

Seth S. Leopold MD: *Congratulations on a thoughtful and well-conducted study. What drove you to take on this important topic?*

James A. Keeney MD: Thank you for highlighting our study. The expectations of our patients are high. Our approaches, diagnostic tools, and techniques must balance quality against cost. We are operating in a time when external pressures increasingly demand that we define value and to practice in a cost-conscious manner.

Like most clinical studies, ours started with a clinical impression obtained from a variety of experiences in our university based practice: namely, that adult patients are frequently referred with advanced imaging studies that do not alter treatment recommendations that would otherwise have been made based on a synthesis of their medical histories,

physical examination findings, and plain radiographic imaging studies. Our first consideration was to assess whether this perception was valid. The question that followed was to define when the imaging modality is the most and least beneficial, and to determine how to define the value of the imaging modality as physicians have been using it in practice.

Dr. Leopold: *It is so clear that we need this kind of inquiry — and the answers it provides — to help us make rational choices both in small, local systems such as healthcare networks, but also at the macro level, in terms of national healthcare decision-making. But I am concerned about the “scalability” of this approach. Will we need a study like this for every one of the hundreds (or thousands) of important tests and interventions our specialty employs, or might there be more efficient ways to get the answers we need to guide providers towards cost-effective practices?*

Dr. Keeney: Your point is important, and there are potential hazards of extrapolating data from a single practice environment or a defined demographic population onto a larger scale without consideration of the context of the study. The value of MRI of the hip in the assessment of specific diagnostic concerns has been substantiated in several prior studies, several

Editor's Spotlight/Take 5

of which we have cited in our manuscript. It is important that physicians with sufficient expertise have the ability to order the tests they need to facilitate and provide definitive diagnosis and treatment. However, it is also important to identify boundaries for the utilization of an expensive imaging modality, so that individuals without that same level of training or experience will know when their use of the study is most likely to benefit their patients.

There are likely hundreds or thousands of individual questions that could be asked and assessed with this type of inquiry, and it may take that many studies or more to get the answers we need. Even so, as different treatments are developed, we must collectively assess how they impact cost, and whether their value justifies their expense. This may result in something of a flood of cost-effectiveness research studies, and it may challenge our ability to individually interpret all of them. This highlights the value of promoting comprehensive clinical practice guidelines and appropriate use criteria from experts in our field. These products are evidence based, and they can help physicians guide their approaches to care.

Dr. Leopold: *Too often, studies on cost-effectiveness focus on patient charges instead of actual institutional*

costs, and the conclusions they draw can range from imprecise to frankly, misleading because charges have little (or nothing) to do with the actual cost of an intervention. At the same time, true costs can be difficult to estimate. How did you work through this key element of study design?

Dr. Keeney: I agree that this is a particular challenge, especially with substantial variability in charges and institutional costs both across and within regional markets. Since our study was accomplished within a federal facility, we used institutional costs for operation of the MRI scanner and image interpretation as they were provided to us by administrative personnel in our hospital. This is understandably lower than the range that individual patients and payors may encounter when these studies are obtained in a free-market system. Still, when considering our estimates reflect a base cost for this procedure, the magnitude of cost inefficiency when MRI is used as a screening tool for incompletely defined hip pain is even more substantial.

Dr. Leopold: *How has your institution reacted to your important findings and/or changed its practice patterns based on them?*

Dr. Keeney: The hospital had already been moving towards a change in process at the time that we initiated the

study as a result of collaborative discussions. The study was conducted looking back at a period before any of the investigators were engaged directly in the care of patients. Now the radiology departmental policy does not proceed with MRI prior to a plain radiograph being obtained.

Dr. Leopold: *I imagine more surgeons are going to want to immerse themselves in the themes raised by your work. Can you recommend a basic source (article or book) for someone just starting to learn about cost-effectiveness in medicine, and perhaps a more advanced source that has influenced your own thinking, for a reader already somewhat familiar with the subject?*

Dr. Keeney: There is a growing body of cost-effectiveness-based research, and I would encourage readers to find a topical area of interest to them and review what has been published in these subject areas. As a starting point, perhaps consider the study by Brauer and colleagues [1] in this journal. In my own specialty of arthroplasty surgery, I also have enjoyed recent articles by Ruiz et al. [7] and Odom et al. [6], which demonstrate both the value and limitations of cost-effectiveness research when extrapolating costs from large databases.

For lighter reading that may draw attention to the challenges of how we engage resources, I would encourage

Editor's Spotlight/Take 5

readers to find and read, “The Cost Conundrum” by Atul Gawande, which was published in *The New Yorker* on June 1, 2009.

I thank you and *Clinical Orthopaedics and Related Research*® for this opportunity to highlight our research. We hope our approach provides investigators with another tool to help define value, and that it helps us and our patients to make more cost-effective healthcare decisions.

References

1. Brauer CA, Neumann PJ, Rosen AB. Trends in cost effectiveness analyses in orthopaedic surgery. *Clin Orthop Relat Res.* 2007;457:42–48.
2. Fowler JR, Maltenfort MG, Ilyas AM. Ultrasound as a first-line test in the diagnosis of Carpal Tunnel Syndrome: A cost-effectiveness analysis. *Clin Orthop Relat Res.* 2013;471:932–937.
3. Gray K, Burns J, Little D, Bellemore M, Gibbons P. Is tibialis anterior tendon transfer effective for recurrent clubfoot? [Published online ahead of print September 24, 2013]. *Clin Orthop Relat Res.* DOI: [10.1007/s11999-013-3287-x](https://doi.org/10.1007/s11999-013-3287-x).
4. Grecula MJ, Noble PC: Editorial comment – symposium: ABJS Carl T. Brighton workshop on outcome measures. *Clin Orthop Relat Res.* 2013;471:3417–3418.
5. Mather RC 3rd, Koenig L, Acevedo D, Dall TM, Gallo P, Romeo A, Tongue J, Williams G Jr. The societal and economic value of rotator cuff repair. *J Bone Joint Surg Am.* 2013;95:1993–2000.
6. Odom SM, Troyer JL, Kelly MP, Dedini RD, Bozic KJ. A cost-utility analysis comparing the cost-effectiveness of simultaneous and staged bilateral total knee arthroplasty. *J Bone Joint Surg Am.* 2013;95:1441–1449.
7. Ruiz D Jr, Koenig L, Dall TM, Gallo P, Narzikul A, Parvizi J, Tongue J. The direct and indirect costs to society of treatment for end-stage knee osteoarthritis. *J Bone Joint Surg Am.* 2013; 95:1473–1480.